# INSTALLATION INSTRUCTIONS
## FOR UPFLOW/HORIZONTAL (-)GPL AND DOWNFLOW (-)GLL TWO STAGE INDUCED DRAFT GAS FURNACES

**RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!**

**⚠WARNING**

**IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

**⚠WARNING**

**THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

**⚠WARNING**

**PROPOSITION 65 WARNING: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.**

**⚠WARNING**

— Do not store or use gasoline or other flammable vapors and liquids, or other combustible materials in the vicinity of this or any other appliance.

— WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Do not return to your home until authorized by the gas supplier or fire department.

— DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.
- U.L. recognized fuel gas and CO detectors are recommended in all applications, and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations, or customs.

— Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

BA001-92

**DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.**

Accredited by the RvA

ABS Quality Evaluations, Inc. Management System Certification

ANSI·RAB QMS ACCREDITED

**ISO 9002**

Certificate Number: 30164

**92-24161-24-07**
SUPERSEDES 92-24161-24-06

Before beginning any troubleshooting procedure, complete the following installation checklist. A furnace malfunction is sometimes caused by an improper installation. By completing this checklist, the problem may be found and corrected. Make copies of the checklist and complete one for every Low Profile Furnace service call for your records.

# INSTALLATION CHECKLIST

**(Refer to this manual for specifics.)**

### GAS SUPPLY

_____ Adequate pipe size

_____ No gas leaks

_____ Proper supply and manifold gas pressure (check with an accurate U-tube manometer with the furnace and all other gas appliances operating.)

### ELECTRICAL

_____ Correct thermostat and subbase _____ Thermostat model _____ Subbase model

_____ Correct thermostat mode and setting

_____ Correct line supply voltage

_____ Correct power supply polarity is required with electronic ignition

_____ Correct furnace ground to electrical panel

_____ DC microamp (μA) flame signal (hot surface ignition units)

_____ Correct control voltage

_____ Measure and set heat anticipator amperage

_____ Air conditioning low voltage wires connected to terminals “Y” “C” - **not with wire nuts**

### VENTING

_____ Correct vent pipe diameter and length (according to CSA tables) _____ Vent connection size

_____ Correct venting material (according to CSA tables)

_____ Correct lining for masonry chimneys

_____ Adequate clearance from combustibles

_____ Proper negative pressure reading in the vent

_____ Vent pipe secured to induced draft blower housing

### COMBUSTION AIR

_____ Proper source of combustion air

_____ Correct combustion air opening size

### FURNACE INSTALLATION

_____ Adequate clearance from combustibles

_____ Adequate clearance for service

_____ Proper air temperature rise (See furnace rating plate)

_____ External static pressure _____ inches w.c.

_____ Correct filter(s)

_____ Correct cooling coil or accessories (if equipped)

_____ Adequate supply and return air ducting _____ Return Air Duct Size _____ Supply Air Duct Size

_____ Air ducts sealed to prevent leakage

**IMPORTANT:** All Rheem products meet current Federal OSHA Guidelines for safety. California Proposition 65 warnings are required for certain products, which are not covered by the OSHA standards.

California's Proposition 65 requires warnings for products sold in California that contain, or produce, any of over 600 listed chemicals known to the State of California to cause cancer or birth defects such as fiberglass insulation, lead in brass, and combustion products from natural gas.

All “new equipment” shipped for sale in California will have labels stating that the product contains and/or produces Proposition 65 chemicals. Although we have not changed our processes, having the same label on all our products facilitates manufacturing and shipping. We cannot always know “when, or if” products will be sold in the California market.

You may receive inquiries from customers about chemicals found in, or produced by, some of our heating and air-conditioning equipment, or found in natural gas used with some of our products. Listed below are those chemicals and substances commonly associated with similar equipment in our industry and other manufacturers.

- Glass Wool (Fiberglass) Insulation
- Carbon Monoxide (CO)
- Formaldehyde
- Benzene

More details are available at the Websites for OSHA (Occupational Safety and Health Administration), at www.osha.gov and the State of California's OEHHA (Office of Environmental Health Hazard Assessment), at www.oehha.org. Consumer education is important since the chemicals and substances on the list are found in our daily lives. Most consumers are aware that products present safety and health risks, when improperly used, handled and maintained.

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**IMPORTANT:** To insure proper installation and operation of this product, completely read all instructions prior to attempting to assemble, install, operate, maintain or repair this product. Upon unpacking of the furnace, inspect all parts for damage prior to installation and start-up.

# SAFETY INFORMATION

**⚠ WARNING**

**USE ONLY WITH TYPE OF GAS APPROVED FOR THIS FURNACE. REFER TO THE FURNACE RATING PLATE.**

**⚠ WARNING**

**INSTALL THIS FURNACE ONLY IN A LOCATION AND POSITION AS SPECIFIED IN THE LOCATION REQUIREMENTS AND CONSIDERATIONS SECTION OF THESE INSTRUCTIONS. PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE FURNACE SPACE AS SPECIFIED IN THE VENTING SECTION OF THESE INSTRUCTIONS.**

**⚠ WARNING**

**PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE FURNACE SPACE AS SPECIFIED IN THE COMBUSTION AND VENTILATION AIR SECTION OF THESE INSTRUCTIONS.**

**⚠ WARNING**

**COMBUSTION PRODUCTS MUST BE DISCHARGED OUTDOORS. CONNECT THIS FURNACE TO AN APPROVED VENT SYSTEM ONLY, AS SPECIFIED IN VENT PIPE INSTALLATION SECTION OF THESE INSTRUCTIONS.**

**⚠ WARNING**

**DO NOT OPERATE THE SYSTEM FOR EXTENDED PERIODS WITHOUT FILTERS. A PORTION OF THE DUST ENTRAINED IN THE AIR MAY TEMPORARILY LODGE IN THE AIR DUCT RUNS AND AT THE SUPPLY REGISTERS. ANY CIRCULATED DUST PARTICLES WILL BE HEATED AND CHARRED BY CONTACT WITH THE FURNACE HEAT EXCHANGER. THIS SOOTY RESIDUE WILL SOIL CEILINGS, WALLS, DRAPES, CARPETS AND OTHER HOUSEHOLD ARTICLES. SOOT DAMAGE MAY ALSO RESULT WITH, OR WITHOUT, FILTERS IN PLACE, WHEN CERTAIN TYPES OF CANDLES ARE BURNED, OR CANDLEWICKS ARE LEFT UNTRIMMED.**

**⚠ WARNING**

**NEVER TEST FOR GAS LEAKS WITH AN OPEN FLAME. USE A COMMERCIALLY AVAILABLE SOAP SOLUTION MADE SPECIFICALLY FOR THE DETECTION OF LEAKS TO CHECK ALL CONNECTIONS, AS SPECIFIED IN GAS SUPPLY AND PIPING SECTION OF THESE INSTRUCTIONS.**

**⚠ WARNING**

**ALWAYS INSTALL FURNACE TO OPERATE WITHIN THE FURNACE'S INTENDED TEMPERATURE-RISE RANGE WITH A DUCT SYSTEM WHICH HAS AN EXTERNAL STATIC PRESSURE WITHIN THE ALLOWABLE RANGE, AS SPECIFIED IN DUCTING SECTION OF THESE INSTRUCTIONS. SEE ALSO FURNACE RATING PLATE.**

**⚠ WARNING**

**WHEN A FURNACE IS INSTALLED SO THAT SUPPLY DUCTS CARRY AIR CIRCULATED BY THE FURNACE TO AREAS OUTSIDE THE SPACE CONTAINING THE FURNACE, THE RETURN AIR SHALL ALSO BE HANDLED BY DUCT(S) SEALED TO THE FURNACE CASING AND TERMINATING OUTSIDE THE SPACE CONTAINING THE FURNACE.**

**⚠ WARNING**

**WHEN THIS FURNACE IS INSTALLED IN A RESIDENTIAL GARAGE, IT MUST BE INSTALLED SO THE BURNERS AND IGNITION SOURCE ARE LOCATED NO LESS THAN 18 INCHES ABOVE THE FLOOR. THIS IS TO REDUCE THE RISK OF IGNITING FLAMMABLE VAPORS WHICH MAY BE PRESENT IN A GARAGE. ALSO, THE FURNACE MUST BE LOCATED OR PROTECTED TO AVOID PHYSICAL DAMAGE BY VEHICLES. FAILURE TO FOLLOW THESE WARNINGS CAN CAUSE A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

**⚠ WARNING**

**INSTALLATION MUST COMPLY WITH ALL INSTALLATION INSTRUCTIONS INCLUDING:**

- **PROPER VENT INSTALLATION'**
- **FURNACE OPERATING UNDER THERMOSTATIC CONTROL;**
- **RETURN AIR DUCT SEALED TO THE FURNACE;**
- **AIR FILTERS IN PLACE;**
- **SET FURNACE INPUT RATE AND TEMPERATURE RISE PER RATING PLATE MARKING;**
- **MEANS FOR PROVIDING OUTDOOR AIR REQUIRED FOR COMBUSTION;**
- **RETURN AIR TEMPERATURE MAINTAINED BETWEEN 55°F (13°C) AND 80°F (27°C) AND**
- **CLEAN FURNACE, DUCT WORK AND COMPONENTS UPON SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROCESS, AND VERIFY FURNACE OPERATING CONDITIONS INCLUDING IGNITION, INPUT RATE, TEMPERATURE RISE AND VENTING, ACCORDING TO THE INSTRUCTIONS.**

# GENERAL INFORMATION

The (-)GPL and (-)GLL series furnaces are design certified by CSA for use with natural and propane gases as follows:

As a Category I furnace, it may be vented vertically with type B-1 vent pipe and also may be common vented as described in these instructions.

These furnaces are design certified by CSA for use with natural or propane gases as Category 1 furnaces and **must be vented vertically only. They are not designed for horizontal venting.**

This furnace should be installed in accordance with the American National Standard Z223.1 - latest edition booklet entitled "National Fuel Gas Code" (NFPA 54) (in Canada, CSA B149.1 and .2 Installation Codes for gas burning appliances), and the requirements or codes of the local utility or other authority having jurisdiction including local plumbing or waste water codes.

Additional helpful publications available from the "National Fire Protection Association" are: NFPA-90A – Installation of Air Conditioning and Ventilating Systems 1985 or latest edition. NFPA-90B – Warm Air Heating and Air Conditioning Systems 1984.

These publications are available from:

National Fire Protection Association, Inc.
Batterymarch Park
Quincy, MA 02269

CSA-INTERNATIONAL
178 Rexdale Blvd.
Etobicoke (Toronto), Ontario
Canada M9W, 1R3

# LOCATION REQUIREMENTS AND CONSIDERATIONS

## GENERAL INFORMATION

**⚠ CAUTION**

**DO NOT USE THIS FURNACE DURING CONSTRUCTION IF AIR LADEN CORROSIVE COMPOUNDS ARE PRESENT SUCH AS CHLORINE AND FLUORINE. OTHERWISE, PROVISIONS MUST BE TAKEN TO PROVIDE CLEAN, UNCONTAMINATED COMBUSTION AND VENTILATION AIR TO THE FURNACE. FURNACE COMBUSTION AND VENTILATION AIR CONTAMINATED WITH THESE COMPOUNDS FORMS ACIDS DURING COMBUSTION WHICH CORRODES THE HEAT EXCHANGER AND COMPONENT PARTS. SOME OF THESE CONTAMINANTS ARE FOUND IN, BUT NOT LIMITED TO, PANELING, DRY WALL, ADHESIVES, PAINTS, STAINES, VARNISHES, SEALERS, AND MASONRY CLEANING MATERIALS.**

1. **NOTE:** This furnace is shipped with heat exchanger support brackets installed under the back of the heat exchanger. These may be removed before installation, but it is not required.

## LOCATION

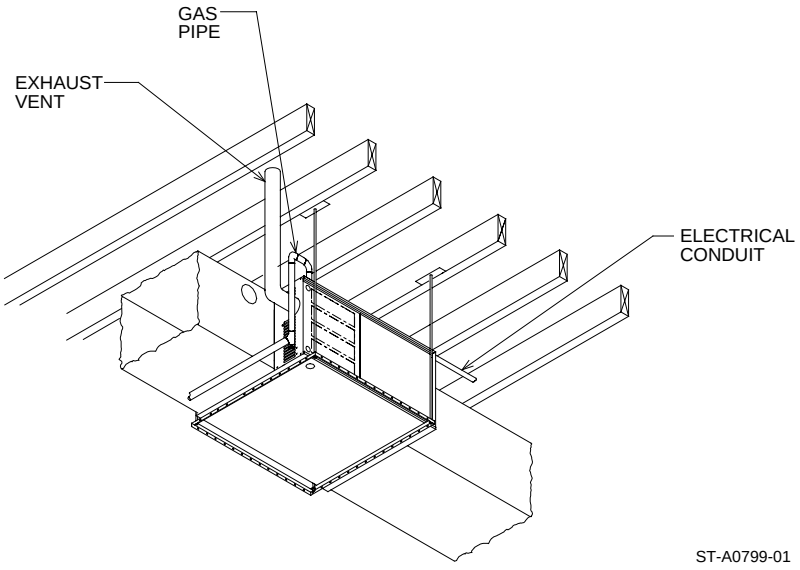
**⚠ WARNING**

**THIS FURNACE IS NOT APPROVED FOR INSTALLATION IN A MOBILE HOME. DO NOT INSTALL THIS FURNACE IN A MOBILE HOME. INSTALLATION IN A MOBILE HOME COULD CAUSE FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

2. **IMPORTANT:** This furnace is not approved or recommended for installation on its back, with access doors facing upwards.
3. This furnace is suitable for installation in buildings constructed on-site. This heating unit should be centralized with respect to the heat distribution system as much as practicable.
4. **IMPORTANT:** If installing the unit over a finished ceiling or living area, be certain to install an auxiliary condensate drain pan under any evaporator coil installed with the furnace.

   **NOTE:** These furnaces are approved for installation in attics, as well as alcoves, utility rooms, closets and crawlspaces.
5. **IMPORTANT:** Support this unit when installed. For attic or crawl space installation, horizontal furnaces may be installed on combustible wood flooring or by using support brackets. See Figure 1.
6. **IMPORTANT:** If installing in a utility room, be sure the door is wide enough to:
   a. allow the largest part of the furnace to pass; or
   b. allow any other appliance (such as a water heater) to pass.

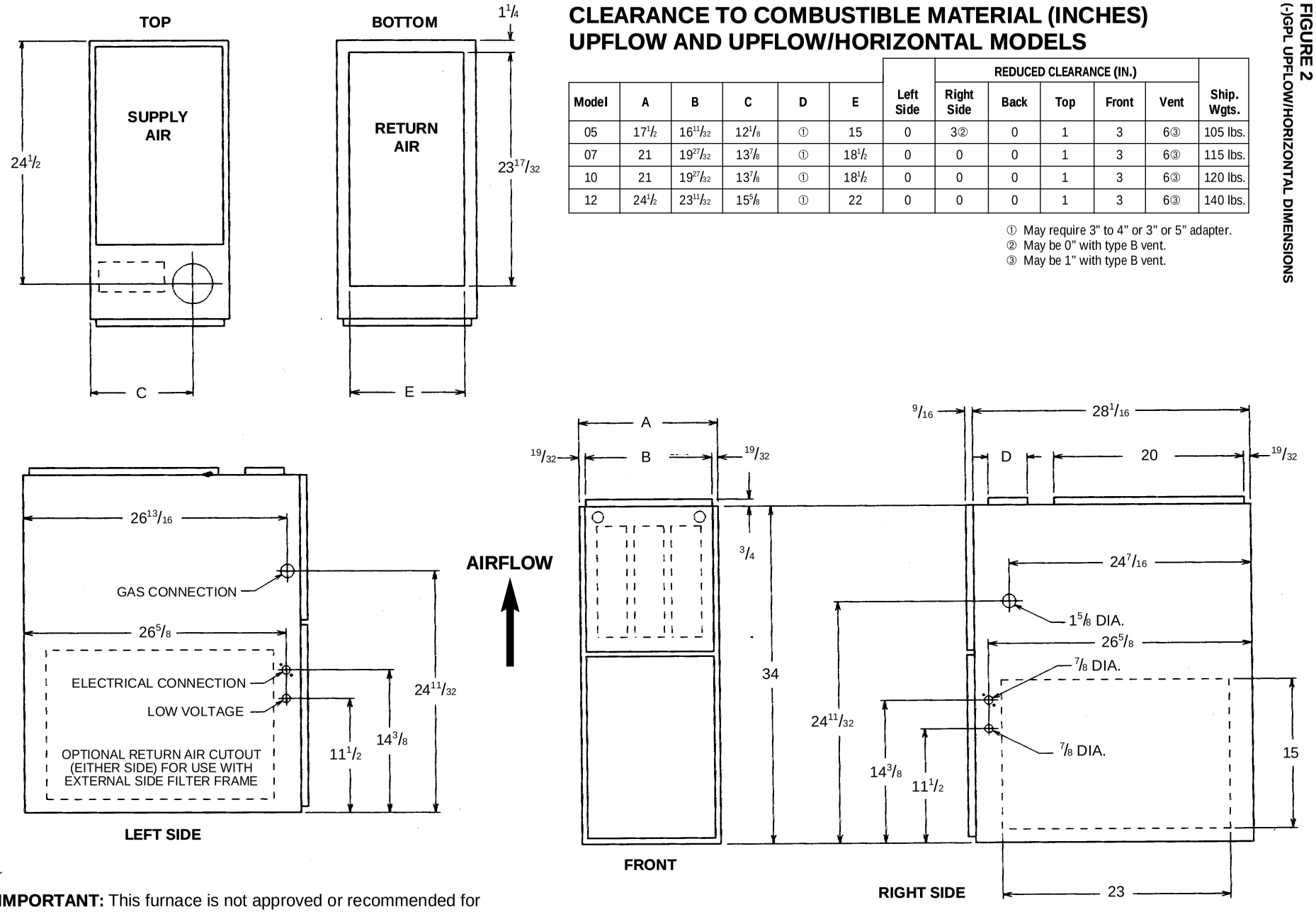
**FIGURE 1**
**HORIZONTAL FURNACE INSTALLED W/SUPPORT BRACKETS**



# CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES) UPFLOW AND UPFLOW/HORIZONTAL MODELS

| Model | A | B | C | D | E | REDUCED CLEARANCE (IN.) Left Side | Right Side | Back | Top | Front | Vent | Ship. Wgts. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 05 | 17 1/2 | 16 11/32 | 12 1/8 | ① | 15 | 0 | 3② | 0 | 1 | 3 | 6③ | 105 lbs. |
| 07 | 21 | 19 27/32 | 13 7/8 | ① | 18 1/2 | 0 | 0 | 0 | 1 | 3 | 6③ | 115 lbs. |
| 10 | 21 | 19 27/32 | 13 7/8 | ① | 18 1/2 | 0 | 0 | 0 | 1 | 3 | 6③ | 120 lbs. |
| 12 | 24 1/2 | 23 11/32 | 15 5/8 | ① | 22 | 0 | 0 | 0 | 1 | 3 | 6③ | 140 lbs. |

① May require 3" to 4" or 3" or 5" adapter.
② May be 0" with type B vent.
③ May be 1" with type B vent.



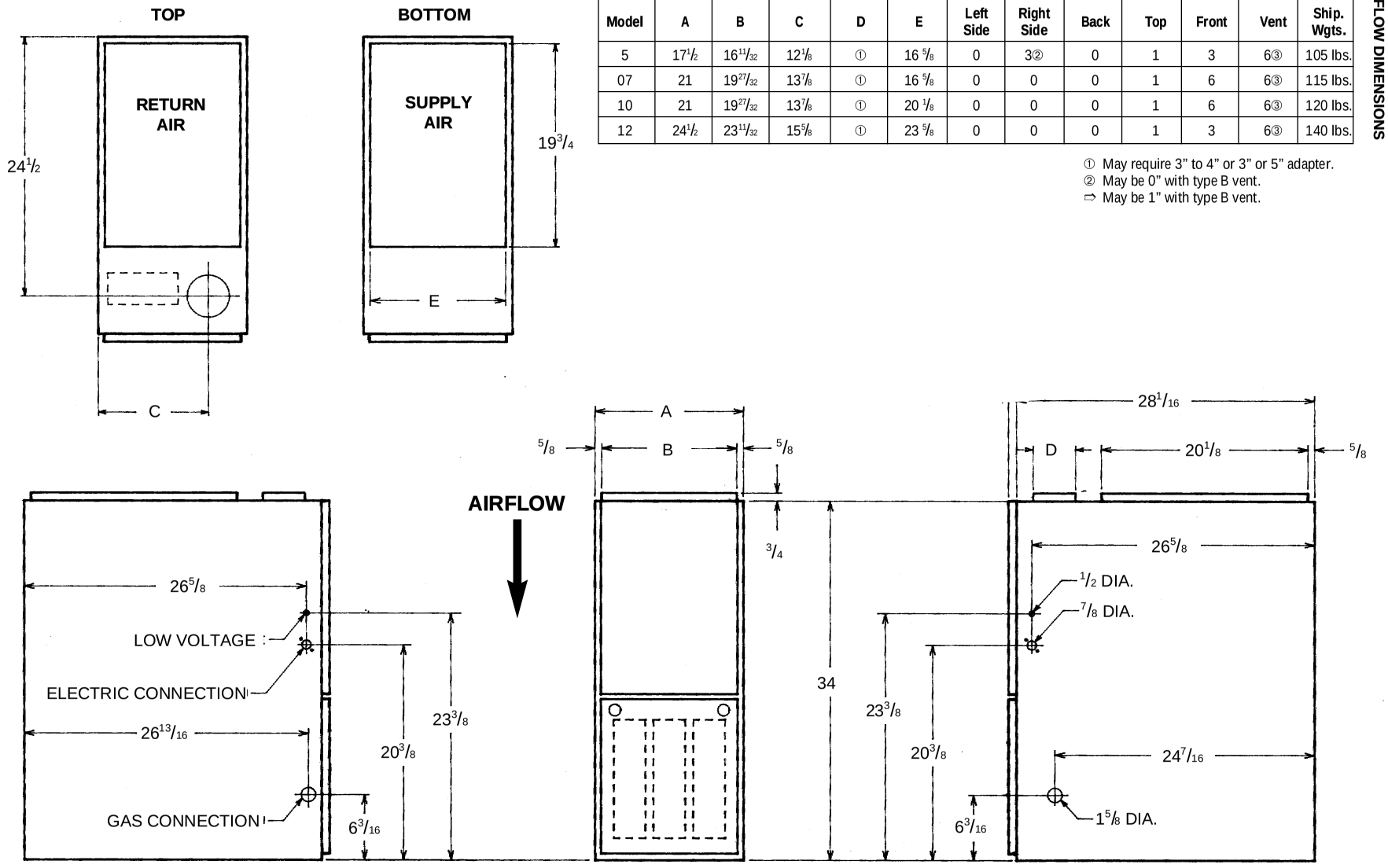

**IMPORTANT:** This furnace is not approved or recommended for installation on its back, with access doors facing upwards.

**FIGURE 2**
**(-)GPL UPFLOW/HORIZONTAL DIMENSIONS**

# CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES) DOWNFLOW MODELS

| Model | A | B | C | D | E | Left Side | REDUCED CLEARANCE (IN.) Right Side | Back | Top | Front | Vent | Ship. Wgts. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 17 1/2 | 16 11/32 | 12 1/8 | ① | 16 5/8 | 0 | 3② | 0 | 1 | 3 | 6③ | 105 lbs. |
| 07 | 21 | 19 27/32 | 13 7/8 | ① | 16 5/8 | 0 | 0 | 0 | 1 | 6 | 6③ | 115 lbs. |
| 10 | 21 | 19 27/32 | 13 7/8 | ① | 20 1/8 | 0 | 0 | 0 | 1 | 6 | 6③ | 120 lbs. |
| 12 | 24 1/2 | 23 11/32 | 15 5/8 | ① | 23 5/8 | 0 | 0 | 0 | 1 | 3 | 6③ | 140 lbs. |

① May require 3" to 4" or 3" or 5" adapter.
② May be 0" with type B vent.
⇨ May be 1" with type B vent.




**NOTE:** IN DOWNFLOW CONFIGURATION, OPTIONAL AIR CUTOUT IS NOT PERMITTED.

**FIGURE 3**
**(-)GLL DOWNFLOW DIMENSIONS**

## CLEARANCE – ACCESSIBILITY

The design of forced air furnaces with input ratings as listed in the tables on the following pages are certified by CSA for the clearances to combustible materials shown in inches.

See name/rating plate and clearance label for specific model number and clearance information.

Service clearance of at least 24 inches is recommended in front of all furnaces.

**ACCESSIBILITY CLEARANCES, WHERE GREATER, MUST TAKE PRECEDENCE OVER FIRE PROTECTION CLEARANCES.**

**⚠ WARNING**

**UPFLOW AND HORIZONTAL FURNACES MUST NOT BE INSTALLED DIRECTLY ON CARPETING, TILE OR OTHER COMBUSTIBLE MATERIAL OTHER THAN WOOD FLOORING. INSTALLATION ON A COMBUSTIBLE MATERIAL CAN RESULT IN FIRE CAUSING PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.**

**DOWNFLOW UNIT DESIGN IS CERTIFIED FOR INSTALLATION ON NON-COMBUSTIBLE FLOOR. A SPECIAL COMBUSTIBLE FLOOR SUB-BASE IS REQUIRED WHEN INSTALLING ON A COMBUSTIBLE FLOOR. FAILURE TO INSTALL THE SUB-BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS OFFERED AS AN ACCESSORY FROM THE FACTORY. SEE THE CLEARANCE LABEL LOCATED INSIDE THE FURNACE FOR THE APPROPRIATE MODEL NUMBER.**

**THE SPECIAL BASE IS NOT REQUIRED WHEN THE FURNACE IS INSTALLED ON TOP OF AN AIR CONDITIONING PLENUM.**

A gas-fired furnace for installation in a residential garage must be installed so that the burner(s) and the ignition source are located not less than 18" above the floor and the furnace is located or protected to avoid physical damage by vehicles.

**UPFLOW UNIT DESIGN REQUIRES A SOLID METAL BASE PLATE (SEE TABLE 1 OR FURNACE CLEARANCE LABEL FOR PART NUMBER) BE IN PLACE WHEN THE FURNACE IS INSTALLED WITH SIDE OR REAR AIR RETURN DUCTS. FAILURE TO INSTALL A BASE PLATE COULD CAUSE PRODUCTS OF COMBUSTION TO BE CIRCULATED INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING.**

**TABLE 1**

| FURNACE WIDTH | BASE PLATE NO. | BASE PLATE SIZE |
|---|---|---|
| 14" | RXGB-D14 | $11\frac{5}{8}$" x $23\frac{9}{16}$" |
| $17\frac{1}{2}$" | RXGB-D17 | $15\frac{1}{8}$" x $23\frac{9}{16}$" |
| 21" | RXGB-D21 | $18\frac{5}{8}$" x $23\frac{9}{16}$" |
| $24\frac{1}{2}$" | RXGB-D24 | $25\frac{5}{8}$" x $23\frac{9}{16}$" |

## SITE SELECTION

1. Select a site in the building near the center of the proposed, or existing, duct system.
2. Give consideration to the vent system piping when selecting the furnace location. Be sure the venting system can travel from the furnace to the termination with minimal length and elbows.
3. Locate the furnace near the existing gas piping. Or, if running a new gas line, locate the furnace to minimize the length and elbows in the gas piping.
4. Locate the furnace to maintain proper clearance to combustibles as shown in Figures 2 & 3.

**⚠ CAUTION**

**WHEN COILS ARE USED WITH AIR HANDLERS OR FURNACES AND INSTALLED ABOVE A FINISHED CEILING OR LIVING AREA, IT IS RECOMMENDED THAT AN AUXILIARY SHEET METAL CONDENSATE DRAIN PAN BE FABRICATED AND INSTALLED UNDER ENTIRE UNIT. FAILURE TO DO SO CAN RESULT IN PROPERTY DAMAGE.**

**⚠ WARNING**

**COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE FURNACE JACKET OR WITHIN THE SPECIFIED CLEARANCES OF THE VENT PIPE. THE AREA AROUND THE FURNACE MUST BE KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. PLACEMENT OF COMBUSTIBLE MATERIALS ON, AGAINST OR AROUND THE FURNACE JACKET CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THE FURNACE OWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.**

## DUCTING

Proper air flow is required for the correct operation of this furnace. Too little air flow can cause erratic operation and can damage the heat exchanger. The duct system must carry the correct amount of air for heating and cooling. Position the unit minimize long runs or runs with many turns and elbows.

Size the ducts according to acceptable industry standards and methods. The total static pressure drop (including evaporator coil, if used) of the entire system should not exceed 0.5" w.c. Be sure to have adequate space for unit filter.

**IMPORTANT:** Some high efficiency filters have a greater than normal resistance to air flow. This can adversely affect furnace operation. BE SURE TO CHECK AIR FLOW if using any filter other than the factory-provided filter.

**NOTE:** DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

**IMPORTANT:** When using outside air, design and adjust the system to maintain a return air temperature above 50°F during the heating season.

**⚠ WARNING**

**NEVER ALLOW PRODUCTS OF COMBUSTION OR THE FLUE PRODUCTS TO ENTER THE RETURN AIR DUCTWORK, OR THE CIRCULATING AIR SUPPLY. ALL RETURN DUCTWORK MUST BE ADEQUATELY SEALED AND SECURED TO THE FURNACE WITH SHEET METAL SCREWS, AND JOINTS TAPED. WHEN A FURNACE IS MOUNTED ON A PLATFORM, WITH RETURN THROUGH THE BOTTOM, IT MUST BE SEALED AIRTIGHT BETWEEN THE FURNACE AND THE RETURN AIR PLENUM.**

**THE RETURN AIR PLENUM MUST BE PERMANENTLY ENCLOSED. NEVER USE A DOOR AS A PART OF THE RETURN AIR PLENUM. THE FLOOR OR PLATFORM MUST PROVIDE SOUND PHYSICAL SUPPORT OF THE FURNACE, WITHOUT SAGGING, CRACKS, GAPS, ETC., AROUND THE BASE AS TO PROVIDE A SEAL BETWEEN THE SUPPORT AND THE BASE.**

**FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.**

**DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT RETURN OR SUPPLY DUCTWORK TO OR FROM ANY OTHER HEAT PRODUCING DEVICE SUCH AS A FIREPLACE INSERT, STOVE, ETC. DOING SO MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY OR PROPERTY DAMAGE.**

**⚠ WARNING**

**BLOWER AND BURNERS MUST NEVER BE OPERATED WITHOUT THE BLOWER DOOR IN PLACE. THIS IS TO PREVENT DRAWING GAS FUMES (WHICH COULD CONTAIN HAZARDOUS CARBON MONOXIDE) INTO THE HOME THAT COULD RESULT IN PERSONAL INJURY OR DEATH.**

## UPFLOW UNITS

1. Set furnace in place and connect the return duct or return air cabinet to unit. Make the connection air-tight to prevent entraining combustion gases from any adjacent fuel-burning appliances. Unit return air may be connected on the sides or bottom of the return air compartment.

   a. Openings in the side must be cut out the full width of the knockouts on the unit. If using side return air, **THE BOTTOM base must be installed**.

   **NOTE:** Where the maximum airflow is 1800 CFM or more, both sides or the bottom must be used for return air.

   b. If using bottom return air, place furnace over return air plenum and seal furnace bottom to return air plenum.

**⚠ WARNING**

**A SOLID METAL BASE PLATE, (SEE TABLE 1) MUST BE IN PLACE WHEN THE FURNACE IS INSTALLED WITH SIDE OR REAR AIR RETURN DUCTS. FAILURE TO INSTALL A BASE PLATE COULD CAUSE PRODUCTS OF COMBUSTION TO BE CIRCULATED INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING OR DEATH.**

2. If summer air conditioning is desired, position the indoor coil on the top of the unit. Insure that no air can bypass this coil.
3. Connect the supply air plenum to the furnace plenum opening.

## DOWNFLOW UNITS

**⚠ WARNING**

**THE DOWNFLOW FURNACE DESIGN IS CERTIFIED FOR INSTALLATION ON A NON-COMBUSTIBLE FLOOR. IF INSTALLED ON A COMBUSTIBLE FLOOR, USE THE SPECIAL BASE SPECIFIED ON THE FURNACE CLEARANCE LABEL. FAILURE TO INSTALL THE SPECIAL BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS SHIPPED FROM THE FACTORY AS AN ACCESSORY.**

1. Position the unit over the supply air plenum and connect.

   a. If installing on a combustible floor **and not using an evaporator coil box,** install the special combustible floor base. See Figure 4.

   b. If summer air conditioning is desired, position the indoor coil on the bottom of the unit. Insure that no air can bypass this coil.

2. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

## HORIZONTAL UNITS

1. Unit can be mounted for left or right side airflow configuration.
2. Position the unit on adequate supports or by using support brackets (see Figure 1) and connect supply plenum.
3. If summer air conditioning is desired, position the indoor coil on the supply air side of the unit. Insure that no air can bypass this coil.
4. Secure the four angle brackets shipped with the unit to the return air opening. See Figure 5. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

**NOTE:** Do not block furnace access with support rods. Maintain clearances recommended in Figure 2. Allow enough space for proper service, maintenance or replacement of the heat exchanger and blower assembly.

**FIGURE 4**
**COMBUSTIBLE FLOOR BASE**

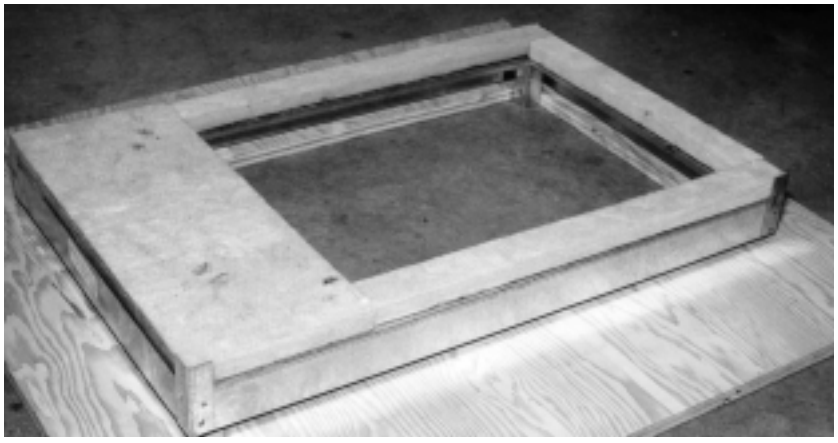
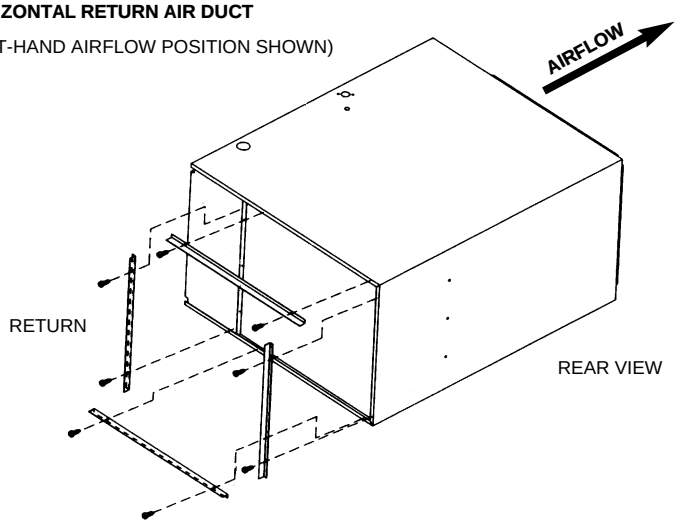


**FIGURE 5**
**HORIZONTAL RETURN AIR DUCT**

(LEFT-HAND AIRFLOW POSITION SHOWN)




FOUR ANGLE BRACKETS ARE SHIPPED WITH EACH UNIT THAT CAN BE INSTALLED HORIZONTALLY. THESE BRACKETS MAY BE USED TO SECURE THE RETURN AIR DUCT TO A HORIZONTAL UNIT.

# COMBUSTION AND VENTILATION AIR

**⚠ WARNING**

**THIS FURNACE AND ANY OTHER FUEL-BURNING APPLIANCE MUST BE PROVIDED WITH ENOUGH FRESH AIR FOR PROPER COMBUSTION AND VENTILATION OF THE FLUE GASES. MOST HOMES WILL REQUIRE THAT OUTSIDE AIR BE SUPPLIED INTO THE FURNACE AREA. FAILURE TO DO SO CAN CAUSE DEATH FROM CARBON MONOXIDE POISONING.**

Adequate facilities for providing air for combustion and ventilation must be provided in accordance with section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI, Z223.1 latest edition or CSA B149.1 and .2 or, applicable provisions for the local building codes, and not obstructed so as to prevent the flow of air to the furnace.

## OVERTEMPERATURE SAFETY SWITCHES

This furnace is equipped with safety switches in the burner compartment to protect against overtemperature conditions caused by inadequate combustion air supply. The switches are located just above the burners on the furnace center panel on upflow and downflow models and also on each side of the burners on upflow/horizontal and horizontal “only” models, and must be manually reset if tripped. DO NOT jumper this switch. If this switch should trip, a qualified furnace installer, service agency or the gas supplier should be called to check and/or correct for adequate combustion air supply. If this unit is mounted in a closet, the door must be closed when making this check of the installation.

DO NOT reset the overtemperature switch without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation.

Replace this switch only with the identical replacement part.

## COMBUSTION AIR REQUIREMENTS

**IMPORTANT:** Air for combustion and ventilation must not come from a corrosive atmosphere. Any failure due to corrosive elements in the atmosphere is excluded from warranty coverage.

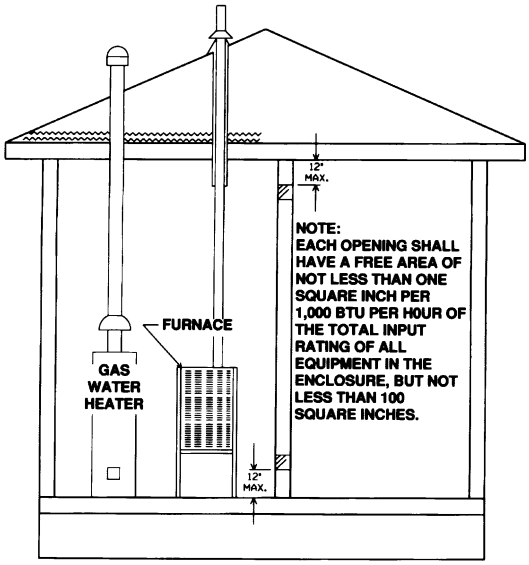
The following types of installation may require OUTDOOR AIR for combustion, due to chemical exposures:

- Commercial buildings
- Buildings with indoor pools
- Furnaces installed in laundry rooms
- Furnaces in hobby or craft rooms
- Furnaces installed near chemical storage areas.

Exposure to the following substances in the combustion air supply may also require OUTDOOR AIR for combustion:

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine-based swimming pool chemicals
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Cements and glues
- Antistatic fabric softeners for clothes dryers
- Masonry acid washing materials

**FIGURE 6**
**AIR FROM HEATED SPACE**


12" MAX.
NOTE:
EACH OPENING SHALL HAVE A FREE AREA OF NOT LESS THAN ONE SQUARE INCH PER 1,000 BTU PER HOUR OF THE TOTAL INPUT RATING OF ALL EQUIPMENT IN THE ENCLOSURE, BUT NOT LESS THAN 100 SQUARE INCHES.
FURNACE
GAS WATER HEATER
12" MAX.

Combustion air must be free of acid forming chemicals; such as sulphur, fluorine and chlorine. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, air fresheners, paint and varnish removers, refrigerants and many other commercial and household products. Vapors from these products when burned in a gas flame form acid compounds. The acid compounds increase the dew point temperature of the flue products and are highly corrosive after they condense.

## ⚠ WARNING

**ALL FURNACE INSTALLATIONS MUST COMPLY WITH THE NATIONAL FUEL GAS CODE AND LOCAL CODES TO PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR FOR THE FURNACE. FAILURE TO DO SO CAN CREATE HAZARDOUS CONDITIONS RESULTING IN PROPERTY DAMAGE, BODILY INJURY OR DEATH FROM SMOKE, FIRE OR CARBON MONOXIDE.**

Combustion air requirements are determined by whether the furnace is in an open (unconfined) area or in a confined space such as a closet or small room.

### EXAMPLE 1. FURNACE LOCATED IN AN UNCONFINED SPACE

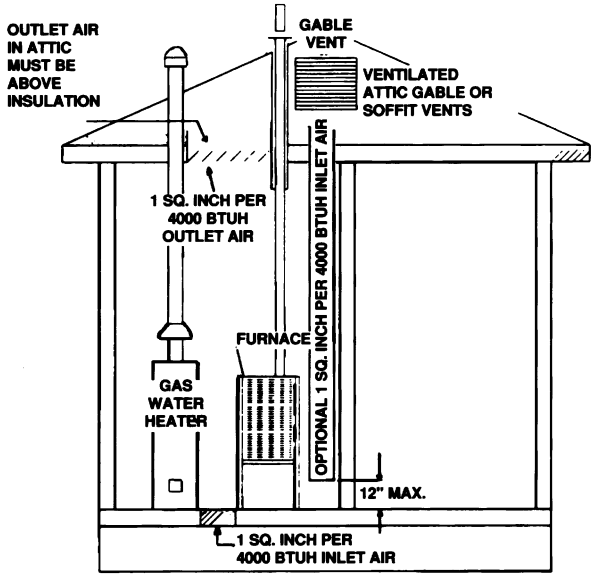
**Using indoor air for combustion.**

An unconfined space must have at least 50 cubic feet for each 1,000 BTUH of the total input for all appliances in the space. Here are a few examples of the room sizes required for different inputs. The sizes are based on 8 foot ceilings.

| BTUH Input | Minimum Sq. Feet With 8' Ceiling | Typical Room Size With 8' Ceiling |
|---|---|---|
| 50,000 | 312 | 14′x24′ or 18′x18′ |
| 75,000 | 469 | 15′x31′ or 20′x24′ |
| 100,000 | 625 | 20′x31′ or 25′x25′ |
| 125,000 | 833 | 23′x34′ or 26′x30′ |

If the open space containing the furnace is in a building with tight construction (contemporary construction), outside air may still be required for the furnace to operate and vent properly. Outside air openings should be sized the same as for a confined space.

**FIGURE 7**
**AIR FROM ATTIC/CRAWL SPACE**


OUTLET AIR IN ATTIC MUST BE ABOVE INSULATION
GABLE VENT
VENTILATED ATTIC GABLE OR SOFFIT VENTS
1 SQ. INCH PER 4000 BTUH OUTLET AIR
OPTIONAL 1 SQ. INCH PER 4000 BTUH INLET AIR
FURNACE
GAS WATER HEATER
12" MAX.
1 SQ. INCH PER 4000 BTUH INLET AIR

### EXAMPLE 2. FURNACE LOCATED IN A CONFINED SPACE

A confined space (any space smaller than shown above as “unconfined”) must have openings into the space which are located in accordance with the requirements set forth in the following subsections A and B. Size the openings by how they are connected to the heated area or to the outside, and by the input of all appliances in the space.

If confined space is within a building with tight construction, combustion air must be taken from outdoors or area freely communicating with the outdoors.

A. USING INDOOR AIR FOR COMBUSTION (See Figure 6)

**IMPORTANT:** Air should not be taken from a heated space with a fireplace, exhaust fan or other device that may produce a negative pressure.

If combustion air is taken from the heated area, the openings must each have at least 100 square inches of free area. Each opening must have at least one square inch of free area for each 1,000 Btuh of total input in the space. Here are some examples of typical openings required.

| Btuh Input | Free Area Each Opening |
|---|---|
| 100,000 | 100 Square Inches |
| 150,000 | 150 Square Inches |

B. USING OUTDOOR AIR FOR COMBUSTION (See Figure 7)

**IMPORTANT:** Never take combustion air from an attic space that is equipped with power ventilation.

The confined space must communicate with the outdoors according to Methods 1 and 2. The minimum air opening dimension shall not be less than 3 inches. When using ducts, they shall be of the same cross-sectional area as the free area of the openings to which they connect.

B: Method 1

Provide two permanent openings, one located within 12 inches of the top and one located within 12 inches of the bottom of the enclosure. Each opening shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

a. Where directly communicating with the outdoors or where communicating to the outdoors through **VERTICAL DUCTS,** each opening shall have a minimum free area of **1 square inch for each 4000 BTUH** of total appliance input rating in the enclosure (see Figure 7). Here are typical duct sizes:

**VERTICAL OUTDOOR AIR OPENING DIMENSIONS**

| BTUH Input | Free Area Each Opening | Round Pipe Size |
|---|---|---|
| 50,000 | 12.50 sq. inches | 4” |
| 75,000 | 18.75 sq. inches | 5” |
| 100,000 | 25.00 sq. inches | 6” |
| 125,000 | 31.25 sq. inches | 7” |

b. Where communicating with outdoors through **HORIZONTAL DUCTS,** each opening shall have a minimum free area of **1 square inch for each 2000 BTUH** of total input rating for all equipment in the enclosure (see Figure 8). Here are typical duct sizes:

**HORIZONTAL OUTDOOR AIR OPENING DIMENSIONS**

| BTUH Input | Free Area Each Opening | Round Pipe Size |
|---|---|---|
| 50,000 | 25.00 sq. inches | 6” |
| 75,000 | 37.50 sq. inches | 7” |
| 100,000 | 50.00 sq. inches | 8” |
| 125,000 | 62.50 sq. inches | 9” |

B: Method 2

One permanent opening, located within 12 inches of the top of the enclosure, shall be permitted where the equipment has clearances of at least 1 inch from the sides and back and 6 inches from the front of the appliance. The opening shall directly communicate with the outdoors or communicate through a vertical or horizontal duct to the outdoors or spaces (crawl or attic) that freely communicate with the outdoors and have a minimum free area of:

a. One square inch for each 3000 BTUH of the total input rating of all equipment located in the enclosure, **AND**

b. Not less than the sum of the areas of all vent connectors in the confined space.

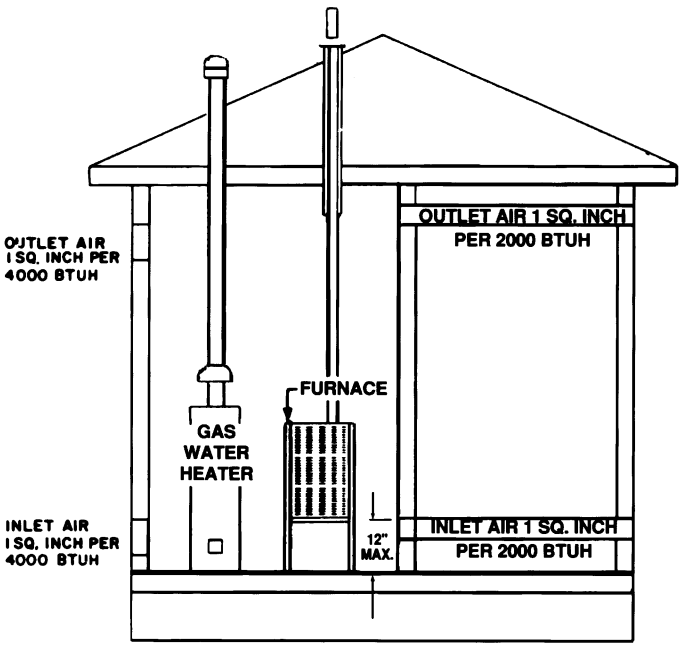
**IMPORTANT:** If the furnace is in a location with an exhaust fan, there must be sufficient ventilation to prevent the exhaust fan from creating a negative pressure in the room.

Combustion air openings must **NOT BE RESTRICTED** in any manner.

CONSULT LOCAL CODES FOR SPECIAL REQUIREMENTS.

Air opening in the furnace casing front, return air grilles, and warm air registers must not be obstructed.

**FIGURE 8**
**OUTSIDE AIR USING A HORIZONTAL INLET & OUTLET**


OUTLET AIR 1 SQ. INCH PER 4000 BTUH
OUTLET AIR 1 SQ. INCH PER 2000 BTUH
FURNACE
GAS WATER HEATER
INLET AIR 1 SQ. INCH PER 4000 BTUH
12" MAX.
INLET AIR 1 SQ. INCH PER 2000 BTUH

# VENTING

## GENERAL INFORMATION

The furnace must be vented in accordance with these instructions, National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2 and requirements or codes of the local utility or other authority having jurisdiction.

**IMPORTANT:** This furnace is not certified for use with a power venter or any other type of horizontal venting.

**⚠ WARNING**

**DEVICES ATTACHED TO THE FLUE OR VENT FOR THE PURPOSE OF REDUCING HEAT LOSS UP THE CHIMNEY HAVE NOT BEEN TESTED AND HAVE NOT BEEN INCLUDED IN THE DESIGN CERTIFICATION OF THIS FURNACE. WE, THE MANUFACTURER, CANNOT AND WILL NOT BE RESPONSIBLE FOR INJURY OR DAMAGE CAUSED BY THE USE OF SUCH UNTESTED AND/OR UNCERTIFIED DEVICES, ACCESSORIES OR COMPONENTS.**

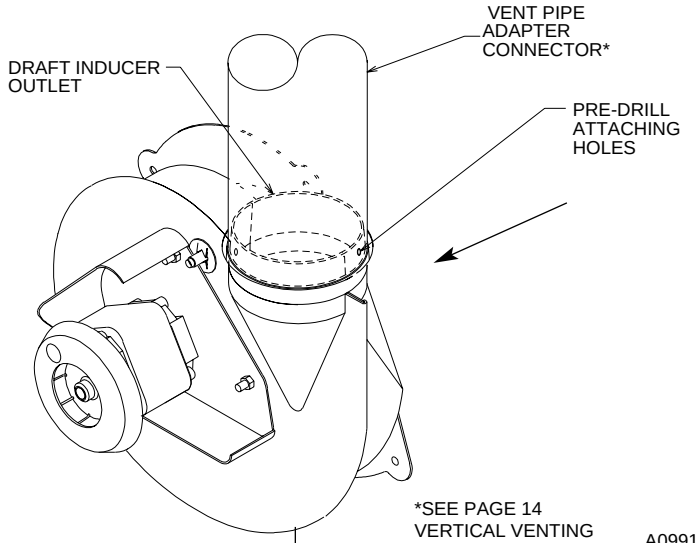
## DRAFT INDUCER

**⚠ WARNING**

**VENT PIPE ATTACHING HOLES MUST BE PREDRILLED IN THE DRAFT INDUCER COLLAR TO PREVENT PLASTIC MATERIAL FROM CRACKING. DRILL 1/8″ DIAMETER HOLES THROUGH THE VENT PIPE AND COLLAR AND USE #8 SCREWS TO ATTACH. SEE FIGURE 9. FAILURE TO FOLLOW THIS WARNING CAN CAUSE RECIRCULATION OF FLUE PRODUCTS CAUSING CARBON MONOXIDE POISONING RESULTING IN PERSONAL INJURY OR DEATH.**

**NOTE:** On downflow units, be certain that the vent pipe is positioned over the induced draft motor outlet. Attach the vent pipe to the induced draft motor collar as noted above.

**FIGURE 9**
**ATTACHING TO DRAFT INDUCER COLLAR**




## FURNACE CATEGORY INFORMATION

This furnace is shipped as a Category I type induced draft furnace. A Category I furnace operates with a nonpositive vent pressure and has a vent gas temperature at least 140°F above the dew point of the vent gases. A Category I type may be a draft hood equipped furnace or have a fan assisted combustion system (induced draft). The inducer is used to pull flue products through the combustion chamber and as they leave the furnace, most of the energy has been dissipated. The buoyant effect of the flue gases provides venting to the outdoors.

During the off cycle, the inducer is off and there is very little flow through the vent, cooling the vent. During the on cycle there is no dilution airflow, as with a draft hood type furnace. Although the vent heats up rapidly without dilution air, the flue products contain more water vapor, which results in a higher dew point temperature. It is most **important** that you follow the guidelines in these instructions to prevent the possible formation of condensation in the venting system.

As a Category I furnace it may be vented vertically with type B-1 vent pipe and also may be common vented, as described in these instructions.

## IMPORTANT APPLICATION NOTES

When the furnace is used as a replacement, the existing vent system should be inspected to assure that there are no obstructions, blockage, or any signs of corrosion.

**NOTE:** When the vent table permits more than one diameter of pipe for a connector or vent, the smallest permitted diameter must be used, vent pipe may be type “B-1,” either rigid or suitable flexible construction that carries a U.L. listing.

Common venting is allowed with vertical B-1 vent systems, and lined masonry chimneys. Follow the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2 for proper installation practices.

Single wall vent connectors to “B-1 vent or masonry chimneys” may be used under the guidelines of the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

**The entire length of the vent connector shall be readily accessible for inspection, cleaning and replacement.**

## "B-1" VERTICAL VENTING

Type "B-1" vents must be installed in accordance with the terms of their listings and the vent manufacturer's instructions.

"B-1" vents must be supported and spaced in accordance with their listings and the manufacturer's instructions. All vents must be supported to maintain their minimum clearances from combustible material.

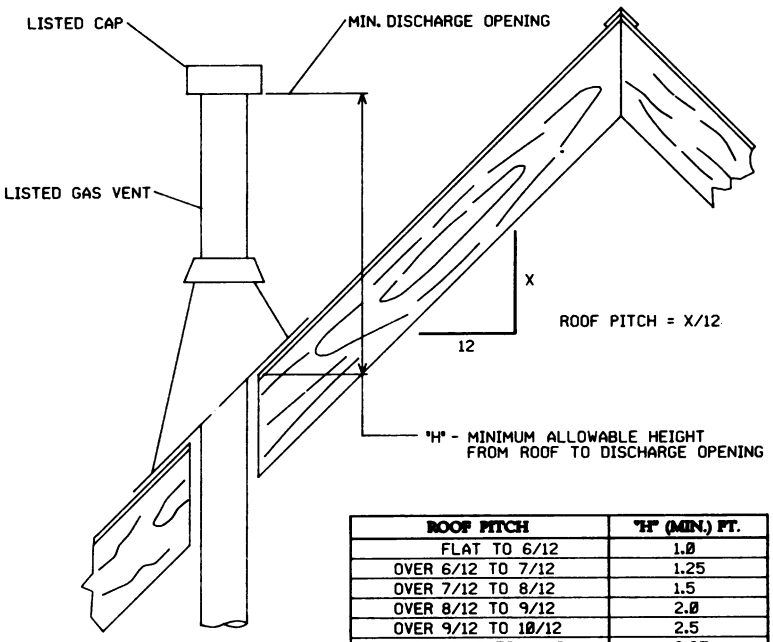
| VERTICAL VENTING | |
|---|---|
| Input | Categorized Furnace Vent Size Required |
| 50K | 3" |
| 75K | *4" |
| 100K | *4" |
| 125K | *4" |

***NOTE:** All furnaces have a 3" vent connection as shipped from the factory. A 3" to 4" or 3" to 5" vent transition is required on all but the 50,000 BTUH models when vertically vented or common vented with metal vent pipes. **THE VENT TRANSITION CONNECTION MUST BE MADE AT THE FURNACE VENT EXIT.** It must originate with an adapter if required, at the furnace flue collar and terminate either in a listed cap or roof assembly. When common venting, the vent connector size may differ from the above diameters depending on application. See ANSI Z21.47-1993/CSA-2.3-M93 or latest edition tables.

VERTICAL VENT SYSTEMS:

1. A gas vent shall terminate above the roof surface with a listed cap or listed roof assembly. Gas vents 12 inches in size or smaller with listed caps shall be permitted to be terminated in accordance with Figure 10, provided they are at least 8 feet from a vertical wall or similar obstruction. All other gas vents shall terminate not less than 2 feet above the highest point where they pass through the roof and at least 2 feet higher than any portion of a building within 10 feet.
2. A type B-1 gas vent shall terminate at least 5 feet in vertical height above the highest connected equipment draft hood or flue collar.
3. Must rise ¼" per foot away from the furnace on horizontal runs and be supported with straps or hangers so it has no sags or dips. Supports at 4 foot intervals and at all elbows are recommended.
4. The vent connector must be mechanically fastened to the outlet collar of the furnace with at least (2) sheet metal screws except vent connectors that are B-1 material. These shall be assembled in accordance with the manufacturer's instructions. See Figure 9.
5. Any angle greater than 45 degrees from the vertical is considered horizontal. The total horizontal distance of a vent plus the horizontal vent connector serving draft-hood equipped appliances shall not be greater than 75 percent of the vertical height of the vent.

**FIGURE 10**
**TYPICAL VENTING WITH "B-1" VENT**




| ROOF PITCH | "H" (MIN.) FT. |
|---|---|
| FLAT TO 6/12 | 1.0 |
| OVER 6/12 TO 7/12 | 1.25 |
| OVER 7/12 TO 8/12 | 1.5 |
| OVER 8/12 TO 9/12 | 2.0 |
| OVER 9/12 TO 10/12 | 2.5 |
| OVER 10/12 TO 11/12 | 3.25 |
| OVER 11/12 TO 12/12 | 4.0 |
| OVER 12/12 TO 14/12 | 5.0 |
| OVER 14/12 TO 16/12 | 6.0 |
| OVER 16/12 TO 18/12 | 7.0 |
| OVER 18/12 TO 20/12 | 7.5 |
| OVER 20/12 TO 21/12 | 8.0 |

**NOTE:** Refer to the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

Single appliance venting of a fan assisted furnace into a tile-lined masonry chimney is prohibited. The chimney must be lined with either Type B vent or with a listed, single wall, metal lining system. Reference National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2. See Figure 11 for typical B-1 vent chase.

**⚠ WARNING**

**DO NOT CONNECT THIS FURNACE TO A CHIMNEY USED TO VENT A SOLID FUEL APPLIANCE (WOOD OR COAL). VENTING WITH A SOLID FUEL APPLIANCE CAN LEAD TO IMPROPER FUNCTIONING OF THE UNIT, AND DUE TO SOOTING, THE POSSIBILITY OF FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

## SPECIAL VENT SYSTEMS (SVS)

**IMPORTANT:** It is THE FURNACE MANUFACTURER's position now that new installations of any HTPV pipe used in a category III vent application, including Selkirk's Selvent™ II HTPV product, should cease immediately.

# EXISTING VENT SYSTEMS

## IMPORTANT RETROFIT VENTING INSTRUCTIONS

If this furnace is a replacement installation, **ALWAYS INSPECT** the existing vent system to be sure there are no obstructions, blockages, or signs of corrosion.

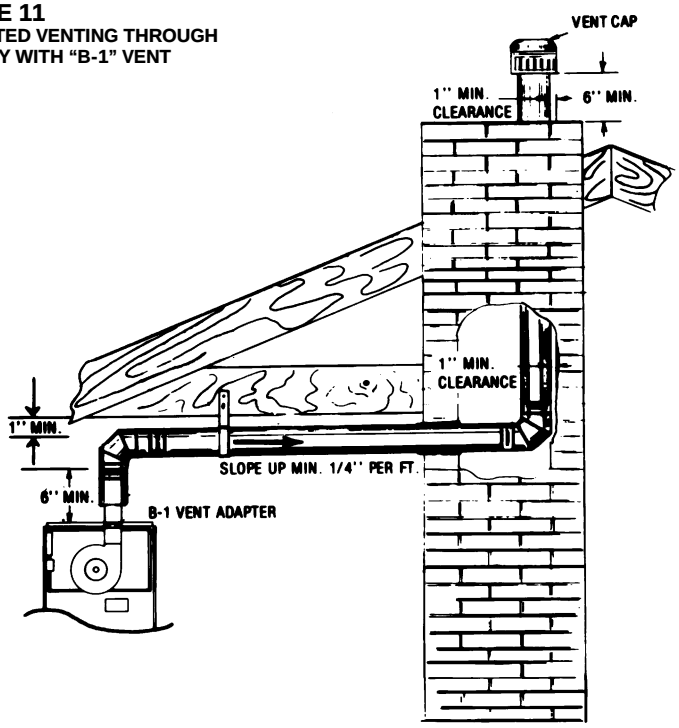
When the existing furnace is removed from a venting system serving other appliances, the venting is likely to be too large to properly vent the remaining attached appliances.

The following steps shall be followed with each appliance that remains connected to the common venting system, while the other appliances that remain connected to the common venting systems are not in operation.

**NOTE:** When the vent table permits more than one diameter of pipe for a connector or vent, the smallest permitted diameter must be used.1. Seal any unused openings in the common venting system.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine that there is no blockage, restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors, windows and all doors between the space where the appliances remaining connected to the common venting system are located. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so the appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
6. After it has been determined that each appliance that remains connected to the common venting system properly vents (when tested as outlined above) return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.
7. If improper venting is observed during any of the above tests, the common venting system must be resized. Refer to National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

**FIGURE 11**
**DEDICATED VENTING THROUGH CHIMNEY WITH "B-1" VENT**



# GAS SUPPLY AND PIPING

## GAS SUPPLY

**⚠ WARNING**

**THIS FURNACE IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT SUPPLIED BY THE DISTRIBUTOR OR MANUFACTURER. MAILING ADDRESSES ARE LISTED ON THE FURNACE RATING PLATE, PARTS LIST AND WARRANTY. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

**See the conversion kit index supplied with the furnace. This index identifies the proper LP Gas Conversion Kit required for each particular furnace.**

**IMPORTANT:** Any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

**IMPORTANT:** Connect this furnace only to gas supplied by a commercial utility.

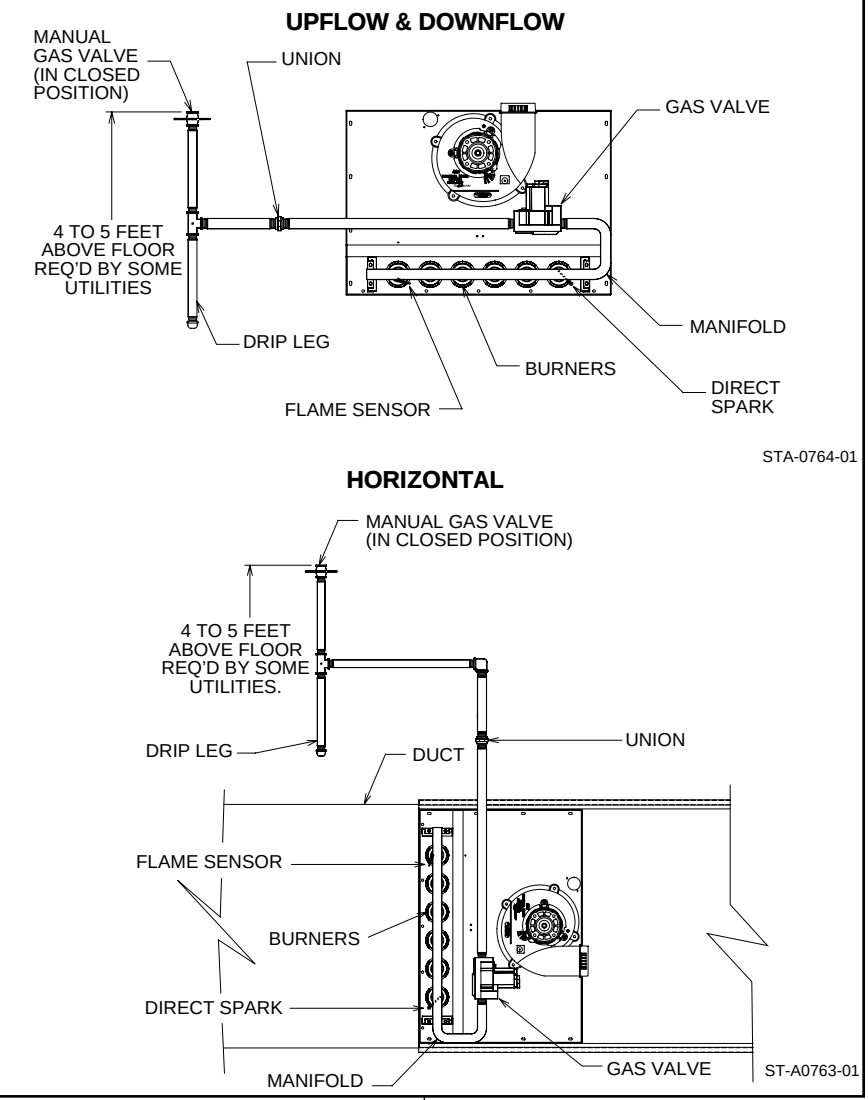
**IMPORTANT:** A U.L. recognized fuel gas and CO detector(s) are recommended in all applications, and their installation should be in accordance with the detector manufacturer's recommendations and/or local laws, rules, regulations or customs.

## GAS PIPING

Install the gas piping according to all local codes, state codes and regulations of the utility company, whichever holds jurisdiction.

If possible, run a separate gas supply line directly from the meter to the furnace. Consult the local gas company for the location of the manual main shut-off valve. **The gas line and manual gas valve must be adequate in size to prevent undue pressure drop and never smaller than the pipe size to the combination gas valve on the furnace.** Refer to Table 2 for the recommended pipe size for natural gas and Table 3 for LP gas pipe sizes.

**FIGURE 12**
**GAS PIPING INSTALLATION**




**IMPORTANT:** It is permissible to run flexible gas connector inside the unit to a piece of black pipe. If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance. Under Massachusetts law, the use of flexible gas connectors is not permitted.

**Install a ground joint union outside the cabinet to easily remove the control valve assembly. Install a manual shut-off valve in the gas line outside the furnace casing.** The valve should be readily accessible to turn the gas supply on or off. Install a drip leg in the gas supply line as close to the furnace as possible. Always use a pipe compound resistant to the action of liquefied petroleum gases on all threaded connections.

**IMPORTANT:** When making gas pipe connections, use a back-up wrench to prevent any twisting of the control assembly and gas valve.

Any strains on the gas valve can change the position of the gas orifices in the burners. This can cause erratic furnace operation.

**IMPORTANT:** ENSURE that the furnace gas control valve not be subjected to high gas line supply pressures.

DISCONNECT the furnace and its individual shut-off valve from the gas supply piping during **any pressure testing that exceeds 1/2 PSIG (3.48 kPa).**

## GAS PRESSURE

**IMPORTANT:** The maximum gas supply pressure to the furnace should be 10.5( w.c. for natural gas and 13( w.c. for LP gas.

Natural gas supply pressure should operate between 5″ to 10.5″ w.c. LP gas supply pressure should be 11″ to 13″ w.c. **This pressure must be maintained with all other gas-fired appliances in operation.**

**NOTE:** Do not exceed a gas pressure of 13 (w.c.).

### ⚠ CAUTION

**ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.**

### ⚠ WARNING

**NEVER PURGE A GAS LINE INTO THE COMBUSTION CHAMBER. NEVER USE MATCHES, FLAME OR ANY IGNITION SOURCE FOR CHECKING LEAKAGE. FAILURE TO FOLLOW THIS WARNING CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

To check for gas leakage, use an approved chloride-free soap and water solution, an electronic combustible gas detector, or other approved method.

## LP CONVERSION

**NOTE:** For installation, see specific LP kit installation instructions.

The valve can be converted to use liquefied petroleum (LP) gas by replacing the pressure regulator spring with the conversion kit spring. This LP kit spring allows the regulator to maintain the proper adjusted manifold pressure for LP gas. The correct burner LP orifices are included in the kit.

**NOTE:** Order the correct LP conversion kit from the local distributor. Furnace conversion to LP gas must be performed by a qualified technician.

### ⚠ CAUTION

**ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.**

### NOx MODELS

When converting furnaces equipped with NOx inserts to LP gas, remove the NOx insert assemblies. Steps for removal are listed below:

1. Turn off all electrical power and the gas supply to the furnace.
2. Remove the burner door from the furnace.
3. Remove the igniter assembly – **handle with care.**
4. Remove the two screws attaching the NOx insert retainer brackets to the center panel. Pull the retainer rod.
5. Put the two screws back into the holes in the center panel.
6. Re-install the igniter and burner assemblies.
7. Replace burner door.
8. Turn on electrical power and gas supply to the unit.

**NOTE:** Some NOx models may have one less NOx insert

## SETTING GAS PRESSURE

The maximum gas supply pressure to the furnace should be 10.5" w.c. natural gas, or 13" w.c. LP gas. The minimum supply gas pressure to the gas valve should be 5" w.c. natural gas or 11" w.c. LP gas. A properly calibrated manometer is required for accurate gas pressure measurements.

### ⚠ CAUTION

**ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.**

**Manifold Gas Pressure Measurement. Natural gas manifold pressure should be 3.5" w.c.; LP gas manifold pressure should be 10" w.c.** Only small variations on gas pressure should be made by adjusting the pressure regulator.

1. With the gas shut off at the manual gas valve, remove the pressure tap plug in the gas manifold or the gas valve outlet. See Figure 24.
2. Connect a U-Tube manometer to this pressure tap. See Figure 25.
3. Turn on the gas supply and operate the furnace in high speed.
4. Note or adjust the manifold gas pressure to give:
   A. 3.5" w.c. for natural gas high fire.
   B. 10" w.c. for LP gas high fire.
5. To adjust the pressure regulator for high fire, remove the regulator cap located on the *side of the regulator.* See Figure 14.
6. Turn the adjustment screw clockwise to increasre pressure or counterclockwise to decrease pressure.
7. Securely replace the regulator cap for high fire.
8. Operate the furnace in low speed.
9. Note or adjust the manifold pressure to give:
   A. 1.7" w.c. for natural gas low fire.
   B. 4.9" w.c. for LP gas low fire.
10. To adjust the pressure regulator for low fire, remove the regulator cap *on the top of the regulator.* See Figure 14.
11. Turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.
12. Securely replace the regulator cap for low fire.

**FIGURE 13**
**TYPICAL HOSE CONNECTION TO LINE PRESSURE TAP**

**FIGURE 14**
**TYPICAL GAS VALVE**

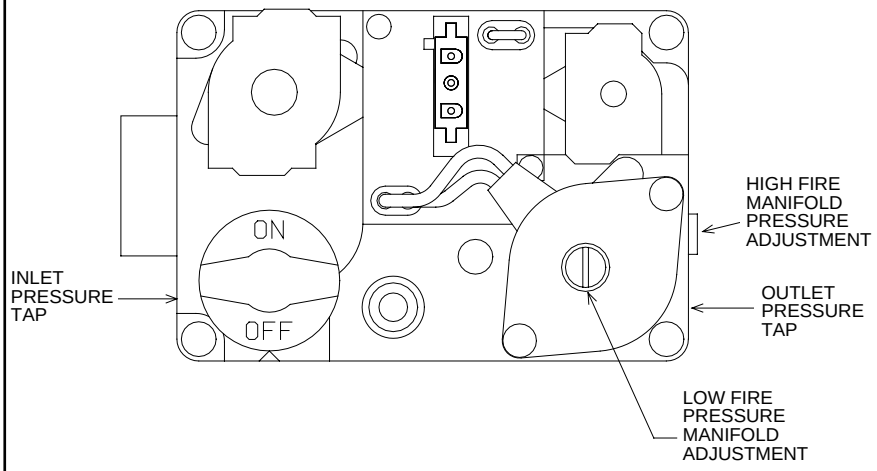



**TABLE 2**
**NATURAL GAS PIPE CAPACITY TABLE (CU. FT./HR.)**

Capacity of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

| Nominal Iron Pipe Size, Inches | Length of Pipe, Feet | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| 1/2 | 132 | 92 | 73 | 63 | 56 | 50 | 46 | 43 |
| 3/4 | 278 | 190 | 152 | 130 | 115 | 105 | 96 | 90 |
| 1 | 520 | 350 | 285 | 245 | 215 | 195 | 180 | 170 |
| 1-1/4 | 1,050 | 730 | 590 | 500 | 440 | 400 | 370 | 350 |
| 1-1/2 | 1,600 | 1,100 | 890 | 760 | 670 | 610 | 560 | 530 |

After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT3)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT3) may be determined by consulting the local natural gas utility or the LP gas supplier.

**TABLE 3**
**LP GAS PIPE CAPACITY TABLE (CU. FT./HR.)**

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure).
(Based on a Pressure Drop of 0.5 Inch Water Column)

| Nominal Iron Pipe Size, Inches | Length of Pipe, Feet | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 125 | 150 |
| 1/2 | 275 | 189 | 152 | 129 | 114 | 103 | 96 | 89 | 83 | 78 | 69 | 63 |
| 3/4 | 567 | 393 | 315 | 267 | 237 | 217 | 196 | 182 | 173 | 162 | 146 | 132 |
| 1 | 1,071 | 732 | 590 | 504 | 448 | 409 | 378 | 346 | 322 | 307 | 275 | 252 |
| 1-1/4 | 2,205 | 1,496 | 1,212 | 1,039 | 913 | 834 | 771 | 724 | 677 | 630 | 567 | 511 |
| 1-1/2 | 3,307 | 2,299 | 1,858 | 1,559 | 1,417 | 1,275 | 1,181 | 1,086 | 1,023 | 976 | 866 | 787 |
| 2 | 6,221 | 4,331 | 3,465 | 2,992 | 2,646 | 2,394 | 2,205 | 2,047 | 1,921 | 1,811 | 1,606 | 1,496 |

Example (LP): Input BTU requirement of unit, 150,000
Equivalent length of pipe, 60 ft. = 3/4" IPS required.

13. Verify pressures for high and low fire operation.
14. Shut off gas at the manual gas valve and remove the U-Tube manometer.
15. Replace the manifold pressure tap plug before turning on gas.

**NATURAL GAS:**
If the supply gas line pressure is above the operating range, install an in-line gas regulator to the furnace. If supply gas line pressure is below the operating range, either remove any restrictions in the gas supply piping or enlarge the gas pipe. See Table 7.

**LP GAS:**
If the supply gas line pressure is above the operating range, have the LP supplier reduce the line pressure at the regulator. If supply gas line pressure is below operating range, have the LP supplier adjust the line pressure at the regulator. See Table 8.

**NOTE:** Depending on the amount of LP vapor and the outdoor ambient temperature, the LP storage tank may require supplemental heat to maintain proper pressure levels.

## ADJUSTING OR CHECKING FURNACE INPUT

**⚠ CAUTION**

**ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.**

**NATURAL GAS:**
The maximum gas supply pressure to the furnace should be 10.5" W.C. for natural gas. The minimum gas supply pressure for purposes of input adjustment to the furnace should be 5" W.C.

A properly calibrated manometer or gauge is required for accurate gas pressure readings.

1. When adjusting the furnace input, the high fire input should be checked. The high fire manifold pressure should be 3.5' W.C. Follow these steps to be sure the furnace is high fire mode:
   a. With a single stage thermostat, the furnace runs for 12 minutes on low fire before shifting to high fire. To be certain that it is on high fire, jump terminals "W" and "W2" on the control board in the blower compartment.
   b. With a two stage thermostat, set the thermostat to its highest setting to keep the furnace operating in the high fire mode.
2. To adjust high fire manifold pressure, remove the adjustment cover screw on the outlet end of the gas valve and turn the adjustment screw clockwise to increase the pressure and counterclockwise to reduce the pressure. Replace the cover screw securely. See Figure 24.
3. The low fire manifold pressure should be 1.7″ W.C. As mentioned above, the furnace remains in the low fire mode for 12 minutes upon a heat call with a single stage thermostat. With a two stage thermostat, disconnect the thermostat lead to the "W2" terminal on the control board and the furnace will remain in the low fire mode. To adjust the pressure, remove the regulator cover, on top of the valve, and adjust as noted under Step 2, above. After the adjustment replace the screw cover securely.

   **NOTE:** Use a 3/32″ allen wrench for making the pressure adjustment.

**TO CHANGE ORIFICE SPUDS:**

1. Shut off the manual main gas valve and remove the gas manifold.
2. Replace the orifice spuds.
3. Reassemble in reverse order.
4. Turn the gas supply back on and check for proper operation and manifold pressure.

Check of input is important to prevent over firing of the furnace beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE.

**TO CHECK FURNACE INPUT:**

1. Make certain that all other gas appliances are shut off, with the exception of pilot burners.
2. Start the furnace
3. Time the meter to measure the time required to burn one cubic foot of gas.
4. Use Table 4 to determine input rate.

**TABLE 4**

**METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR LP GAS**

| INPUT BTU/HR | METER SIZE CU. FT. | HEATING VALUE OF GAS BTU PER CU. FT. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 900 | | 1000 | | 1040 | | 1100 | | 2500 | |
| | | MIN. | SEC. | MIN. | SEC. | MIN. | SEC. | MIN. | SEC. | MIN. | SEC. |
| 50,000 | ONE | 1 | 5 | 1 | 12 | 1 | 15 | 1 | 18 | 3 | 20 |
| | TEN | 10 | 50 | 12 | 00 | 12 | 30 | 13 | 12 | 30 | 00 |
| 75,000 | ONE | 0 | 44 | 0 | 48 | 0 | 50 | 0 | 53 | 2 | 0 |
| | TEN | 7 | 12 | 8 | 0 | 8 | 19 | 8 | 48 | 20 | 0 |
| 100,000 | ONE | 0 | 33 | 0 | 36 | 0 | 38 | 0 | 40 | 1 | 30 |
| | TEN | 5 | 24 | 6 | 0 | 6 | 15 | 6 | 36 | 15 | 0 |
| 125,000 | ONE | 0 | 26 | 0 | 29 | 0 | 30 | 0 | 32 | 1 | 12 |
| | TEN | 4 | 19 | 4 | 48 | 5 | 0 | 5 | 17 | 12 | 0 |
| 150,000 | ONE | 0 | 31 | 0 | 24 | 0 | 25 | 0 | 26 | 1 | 0 |
| | TEN | 3 | 36 | 4 | 0 | 4 | 10 | 4 | 20 | 10 | 0 |

$$\text{Input BTU/HR} = \frac{\text{Heating Value of Gas (BTU/Ft}^3\text{)} \times 3600 \times \text{correction factor}}{\text{Time in Seconds (for 1 cu.ft.) of Gas}}$$

# ELECTRICAL WIRING

**⚠ WARNING**

**TURN OFF ELECTRIC POWER AT THE FUSE BOX OR SERVICE PANEL BEFORE MAKING ANY ELECTRICAL CONNECTIONS.**

**ALSO, THE GROUND CONNECTION MUST BE COMPLETED BEFORE MAKING LINE VOLTAGE CONNECTIONS. FAILURE TO DO SO CAN RESULT IN ELECTRICAL SHOCK, SEVERE PERSONAL INJURY OR DEATH.**

**IMPORTANT:** The furnace must be installed so that the electrical components are protected from water (furnace condensate).

## ELECTRICAL CONNECTIONS

**⚠ WARNING**

**THE CABINET MUST BE PERMANENTLY GROUNDED. A GROUND SCREW IS PROVIDED IN THE JUNCTION BOX FOR THIS PURPOSE. FAILURE TO DO SO CAN RESULT IN FIRE, ELECTRICAL SHOCK, PERSONAL INJURY OR DEATH.**

The electrical supply requirements are listed on the furnace rating plate.

Use a separate fused branch electrical circuit containing a properly sized fuse or circuit breaker. Run this circuit directly from the main switch box to an electrical disconnect which must be readily accessible and located within sight of the furnace. Connect from the disconnect to the junction box on the left side of the furnace, inside the control compartment. See appropriate wiring diagram.

**NOTE:** The electrical junction box inside the furnace control compartment may be relocated to the right side if necessary. A knockout is provided.

**NOTE:** L1 (hot) and neutral polarity must be observed when making field connections to the furnace. The ignition control on electric ignition models will not sense flame if L1 and neutral are reversed.

Installation of the electric supply line should be in accordance with the National Electric Code ANSI/NFPA No. 70, latest edition, or Canadian Electrical Code Part 1 - CSA Standard C22.1 and local building codes.

This can be obtained from:

National Fire Protection Association
Batterymarch Park
Quincy, MA 02269

Canadian Standards Association
178 Rexdale Blvd.
Etobicoke (Toronto), Ontario
Canada M9W, 1R3

**FIGURE 15**
**ISOLATION RELAY**

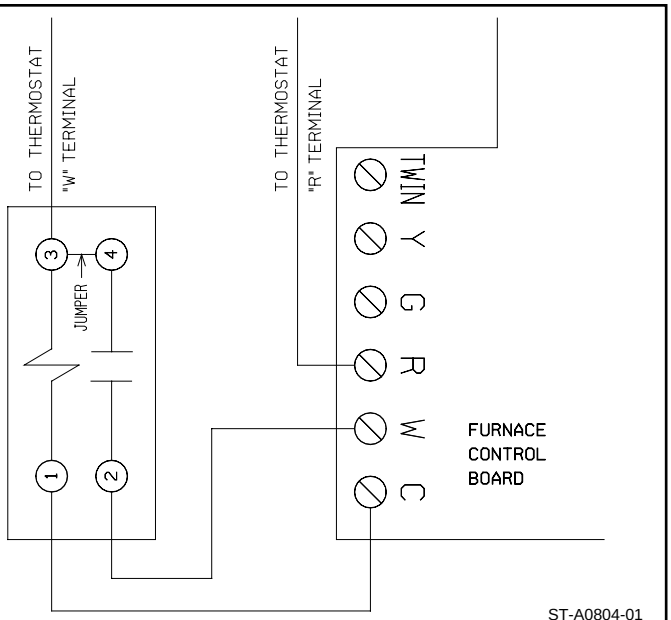
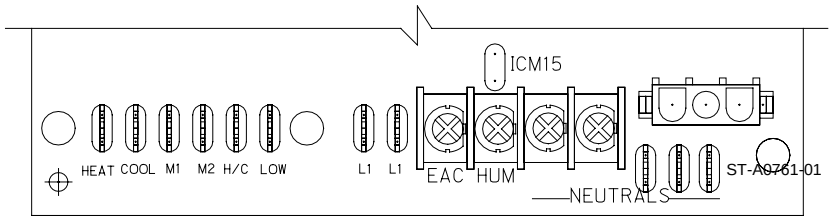



**FIGURE 16**
**LINE VOLTAGE CONNECTIONS**
**UT ELECTRONIC CONTROLS 1028-928 CONTROL BOARDS**




# THERMOSTAT

A single or two stage thermostat may be used, however a two-stage thermostat is recommended for optimum performance.

The room thermostat must be compatible with the integrated furnace control on the furnace. All thermostats available from the furnace manufacturer's Parts Department are acceptable. Generally, all thermostats that are not of the "current robbing" type are compatible with the integrated furnace control we use.

### HEAT ANTICIPATOR SETTINGS

If a current reading taken at the thermostat is not performed, an initial setting of .15 amps is recommended. Adjust as needed to improve comfort level.

## ISOLATION RELAY

**IMPORTANT:** Not all electronic night setback thermostats are compatible with the furnace control system. Some may require an isolation relay.

If an isolation relay is needed (part number 42-25104-01), install it as close to the control board as possible. Use a single-pole, single-throw relay with a 24-volt operating coil. The relay contacts should be designed for 24-volt loads.

Connect one end of the operating coil to the thermostat "W" terminal. Connect the other end of the coil to the "C" terminal on the control board. See Figure 15.

Connect one side of the normally open contacts to the control board "W" terminal.

When the thermostat calls for heat, it powers the 24-volt operating coil. This closes the relay contacts and conducts power from terminal 3 and 4 to terminal "W" on the control board and starts the furnace ignition sequence.

# FIELD INSTALLED OPTION ACCESSORIES

**ELECTRONIC AIR CLEANER**

1. Electronic air cleaner line voltage power can be supplied from the screw terminal “EAC” and a line voltage neutral screw terminal on the control board. See Figure 16. This will power the electronic air cleaner whenever the circulating air blower is in operation.

**HUMIDIFIER**

((-)GPH & (-)GLH MODELS ONLY)

2. Humidifier line voltage power can be supplied from screw terminal “HUM” to a line voltage neutral screw terminal on the control board. See Figure 16. This will power the humidifier whenever the inducer is operating in the heating mode.

**NOTE:** Maximum current –1.0 amps for each option.

# RXGW-B01 CHIMNEY ADAPTER

This appliance is CSA certified for use with RXGW-B01 chimney adapter. Refer to Kit Installation Instructions 92-101682-01.

# FURNACE TWINNING

**IMPORTANT:** Twinning of (-)GPL and (-)GLL models is not allowed.

# 80+ HIGH ALTITUDE INSTRUCTIONS

**⚠ CAUTION**

**THE NATIONAL FUEL GAS CODE (NFGC) GUIDELINES SHOULD BE FOLLOWED WHEN CONVERTING THESE FURNACES FOR HIGH ALTITUDE OPERATION.**

# -GPL/-GLL HIGH ALTITUDE KITS

All -GPL/-GLL models can be converted for high altitude using the following kits:

| High Altitude Kit | Models |
|---|---|
| RXGY-F13 | ALL -GPL models |
| RXGY-F28 | -GLL-05, GLL-07(all), -GLL-10 |
| RXGY-F27 | -GLL-12 |

The kits include pressure switches and instructions for converting the furnace for elevations above 5,000 ft. These kits should never be used at elevations below 5,000 ft. In addition, the kit instructions detail how to re-calculate burner orifice size based on gas heating value and elevation. The instructions are based on a required 4% per thousand feet reduction in input as specified by the *National Fuel Gas Code* (NFGC). Specific orifices should always be recalculated for all high altitude installations as outlined below. Orifices should be changed, if necessary, based on gas heating value and elevation.

# -GPL/-GLL -HIGH ALTITUDE OPTION #278

Furnaces can be ordered from the factory already converted for high altitude elevations. The factory option for high altitude elevations would be ordered as a 278 option (example: a 100k BTU upflow furnace which is factory converted for high altitude elevations would have the model number -GPL-10EBRMR**278**). These factory converted furnaces come with pressure switches for high-altitude elevations already attached. Also, different burner orifices are installed at the factory which are one drill size smaller (#43 DMS) than standard -GPL/-GLL gas furnaces (#42 DMS). The smaller orifice is installed to accommodate for average heating values expected in most high altitude areas and a required 4% per thousand feet reduction in input as specified by the *National Fuel Gas Code* (NFGC). Specific orifices should always be recalculated for all high altitude installatons as outlined below. Orifices should be changed, if necessary, based on gas heating value and elevation.

**⚠ CAUTION**

**ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. THE FOLLOWING EXAMPLES SHOW HOW TO DETERMINE IF AN ORIFICE CHANGE WILL BE NECESSARY AND HOW TO DETERMINE THE NEW ORIFICE SIZE.**

**IN CANADA, AS AN ALTERNATE TO ADJUSTING THE BURNER ORIFICE SIZE, THE MANIFOLD GAS PRESSURE MAY BE ADJUSTED. THIS METHOD IS COVERED LATER IN THIS SECTION. THIS METHOD OF ADJUSTING MANIFOLD PRESSURE MAY ONLY BE USED IN CANADIAN INSTALLATIONS.**

34″ 80 Plus furnaces installed above 2,000 ft. require the furnace to be de-rated 4% per thousand feet.

**IMPORTANT:** Factory installed orifices are calculated and sized based on a sea level Natural Gas heating value of 1075 BTU per cubic ft.

**NOTE:** Orifices are available through your local distributor.

The following are examples of orifice sizing using the National fuel Gas Code Appendix F. For a simplified estimation of orifice size based on altitude and fuel heating value, Tables 5 and 8 can be used. However, calculations are the best method.

**Example: 900 BTU/ft³ Regional Natural Gas Heating Value**

I / H = Q
25000 / 900 = 27.78 ft³

I = Sea Level input (per burner): 25000
H = Sea Level Heating Value: 900
Q = 27.78 ft.³ Natural Gas per hour.

From Table F.1 of *National Fuel Gas Code Handbook, 2002* (3.5″ w.c. column).
Orifice required at Sea Level: #40

From Table F.4 of *National Fuel Gas Code Handbook, 2002*
Orifice required at 5000 ft. elevation (4% de-rate per thousand ft.): #42
Orifice required at 8000 ft. elevation (4% de-rate per thousand ft.): #44

**Example: 1050 BTU/ft³ Regional Natural Gas Heating Value**

I / H = Q
25000 / 1050 = 23.81 ft³

I = Sea Level input (per burner): 25000
H = Sea Level Heating Value: 1050
Q = 23.81 ft.³ Natural Gas per hour.

From Table F.1 of *National Fuel Gas code Handbook, 2002* (3.5″ w.c. column).
Orifice required at Sea Level: #43

From Table F.4 of *National Fuel Gas code Handbook, 2002*
Orifice required at 5000 ft. elevation (4% de-rate per thousand ft.): #45
Orifice required at 8000 ft. elevation (4% de-rate per thousand ft.): #47

**TABLE 5**
**NATURAL GAS ORIFICE DRILL SIZE (4% PER 1000 FT. DE-RATE)**
**IMPORTANT: 80+ MODELS ONLY. DO NOT USE THIS CHART WITH ANY 90+ MODELS.**
BURNER INPUT (PER BURNER) 25,000 BTU @ SEA LEVEL

| Annual Avg. Heat Value (btu per ft³) | Sea level to 1999 ft | 2000 to 2999 ft | 3000 to 3999 ft | 4000 to 4999 ft | 5000 to 5999 ft | 6000 to 6999 ft | 7000 to 7999 ft | 8000 to 8999 ft |
|---|---|---|---|---|---|---|---|---|
| 850 | 38 | 39 | 40 | 41 | 41 | 42 | 42 | 43 |
| 900 | 40 | 41 | 42 | 42 | 42 | 43 | 43 | 44 |
| 975 | 41 | 42 | 42 | 42 | 43 | 43 | 44 | 44 |
| 1075 | 42 | 42 | 43 | 43 | 43 | 44 | 44 | 45 |
| 1170 | 43 | 44 | 44 | 44 | 45 | 45 | 46 | 47 |

## LP GAS AT HIGH ALTITUDE ELEVATION (TABLE 6)

**NOTE:** Keep any parts removed during LP conversion procedure stored with the product literature for future use.

LP Gas is a manufactured gas that has consistent heating value across most regions.

The NFGC guidelines are used with the following exception:

The recommended LP Gas high altitude orifice selections differ slightly in that the NFGC LP orifice chart, as they are not accurate for Rheem products. The National Fuel Gas Code LP orifices are based on an 11″ of water column pressure at the orifice, which differs from Rheem products that use 10″ of water column at the orifice. This difference requires a deviation from the NFGC orifice size recommendations. The Sea Level input should still be reduced by 4% per thousand ft. and the orifice size must be selected based on the reduced input in Table 6.

**TABLE 6**
**IMPORTANT: 80+ MODELS ONLY. DO NOT USE THIS CHART WITH ANY 90+ MODELS.**
**LP GAS**

| Altitude | Input (per burner) 25000 | Orifice Size |
|---|---|---|
| 0 to 2000 ft. | 25000 | #54 |
| 2001′-3000′ | 24000 | #54 |
| 3001′-4000′ | 23000 | #54 |
| 4001′-5000′ | 22000 | #54 |
| 5001′-6000′ | 21000 | #54 |
| 6001′-7000′ | 20000 | #54 |
| 7001′-8000′ | 19000 | #55 |
| 8001′-9000′ | 18000 | #55 |
| 9001′-10000′ | 17000 | #55 |

## ORIFICE ORDERING INFORMATION

Orifice sizes are selected by adding the 2-digit drill size required in the orifice part number. Drill sizes available are 39 through 64; metric sizes available 1.10mm (-90) and 1.15mm (-91):

Orifice Part Number 62-22175-(drill size)

Example 1:
#60 drill size orifice required
Part # 62-22175-60

Example 2:
1.15mm drill size orifice required
Part #62-22175-91

## ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE

In Canada, unless an orifice change is specifically mandated by local codes, an alternate method of altitude deration through a reduction in manifold pressure is acceptable as described in Table 7. This information is based on a heating value of 1000 BTU per cubic feet of natural gas, and 2500 BTU per cubic feet of LP gas.

**IMPORTANT:** Actual input rates must be measured onsite with manifold pressure adjustment to ensure that an actual 10% reduction in input rate is achieved.

Once this field adjustment has been made, the label shown in Figure 17 must be affixed in a conspicuous location on the front of the furnace cabinet.

**NOTE:** This label is supplied in the information packet shipped with each furnace.

## FURNACE INSTALLATION WITH HIGH-EFFICIENCY PREMIUM COOLING SYSTEMS

Furnace installation with Rheem/Ruud -ARA or -ARL outdoor condensing units can provide high efficiency (up to 16 SEER) cooling operation. Using Tables 9 and 10, and literature provided with the cooling equipment, the installer needs to make sure that the proper evaporator coil, condensing coil and airflow is configured to achieve rated efficiency.

**TABLE 7**
**ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE**
**IMPORTANT: 80+ MODELS ONLY. DO NOT USE THIS CHART FOR ANY 90+ MODELS.**

**HIGH FIRE NATURAL GAS**

| ALTITUDE | INPUT | OUTPUT | ORIFICE SIZE | MANIFOLD PRESSURE |
|---|---|---|---|---|
| 0' - 2000' | 50,000<br>75,000<br>100,000<br>125,000<br>150,000 | 40,000<br>60,000<br>80,000<br>100,000<br>120,000 | #42 | 3.5" W.C. |
| 2001' - 4500' | 45,000<br>67,500<br>90,000<br>112,500<br>135,000 | 36,000<br>54,000<br>72,000<br>90,000<br>108,000 | #42 | 2.9" W.C. |

**HIGH FIRE LP GAS**

| ALTITUDE | INPUT | OUTPUT | ORIFICE SIZE | MANIFOLD PRESSURE |
|---|---|---|---|---|
| 0' - 2000' | 50,000<br>75,000<br>100,000<br>125,000<br>150,000 | 40,000<br>60,000<br>80,000<br>100,000<br>120,000 | #54 | 10" W.C. |
| 2001' - 4500' | 45,000<br>67,500<br>90,000<br>112,500<br>135,000 | 36,000<br>54,000<br>72,000<br>90,000<br>108,000 | #54 | 8.1" W.C. |

**LOW FIRE NATURAL GAS**

| ALTITUDE | INPUT | OUTPUT | ORIFICE SIZE | MANIFOLD PRESSURE |
|---|---|---|---|---|
| 0' - 2000' | 35,000<br>52,500<br>70,000<br>87,500<br>105,000 | 28,000<br>42,000<br>56,000<br>70,000<br>84,000 | #42 | 1.7" W.C. |
| 2001' - 4500' | 31,500<br>47,250<br>63,000<br>78,750<br>94,500 | 25,200<br>37,800<br>50,400<br>63,000<br>75,600 | #42 | 1.4" W.C. |

**LOW FIRE LP GAS**

| ALTITUDE | INPUT | OUTPUT | ORIFICE SIZE | MANIFOLD PRESSURE |
|---|---|---|---|---|
| 0' - 2000' | 35,000<br>52,500<br>70,000<br>87,500<br>105,000 | 28,000<br>42,000<br>56,000<br>70,000<br>84,000 | #54 | 4.9" W.C. |
| 2001' - 4500' | 31,500<br>47,250<br>63,000<br>78,750<br>94,500 | 25,200<br>37,800<br>50,400<br>63,000<br>75,600 | #54 | 4.0" W.C. |

**FIGURE 17**
**MANIFOLD PRESSURE-CHANGE LABEL**

THE MANIFOLD PRESSURE OF THIS APPLIANCE HAS BEEN FIELD ADJUSTED TO OBTAIN THE CORRECT INPUT RATING FOR INSTALLATION AT ALTITUDES BETWEEN 2,000 FEET AND 4,500 FEET ELEVATION.

LA PRESSION DU DISTRIBUTEUR D'ALIMENTATION DE CET APPAREIL A ÉTÉ AJUSTÉ SUR LES LIEUX AFIN D'OBTENIR LA BONNE PUISSANCE D'ENTRÉE POUR UNE INSTALLATION ENTRE 2000 ET 4500 PIEDS D'ALTITUDE. 92-24399-01-01

**TABLE 8**
**SUPPLEMENTAL ORIFICE SIZE CHART**

80 Plus Models Only with 25,000 Btu's per Burner – Do not use this chart for any 90+ models.

| NATURAL GAS QUICK REFERENCE CHART FOR ORIFICE SELECTION, AT 3.5" W.C. AND APPROXIMATE FINAL FIRING RATES | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sea Level Orifice Size** | **Sea Level Cubic Foot at 3.5" W.C.** | **80 Plus Heat Value at 25,000** | **ELEVATION CHART (NFG recommended orifice based on 4% derate for each 1000 foot of elevation, based on the intersection of the orifice required at Sea Level and the elevation required below)** | | | | | | | | | |
| | | | **0-999** | **1000-1999** | **2000-2999** | **3000-3999** | **4000-4999** | **5000-5999** | **6000-6999** | **7000-7999** | **8000-8999** | **9000-9999** |
| 37 | 30.63 | 816 | 37 | 37 | 38 | 39 | 39 | 40 | 41 | 42 | 42 | 43 |
| 38 | 29.25 | 855 | 38 | 38 | 39 | 40 | 41 | 41 | 42 | 42 | 43 | 43 |
| 39 | 28.2 | 887 | 39 | 39 | 40 | 41 | 41 | 42 | 42 | 43 | 43 | 44 |
| 40 | 27.03 | 925 | 40 | 40 | 41 | 42 | 42 | 42 | 43 | 43 | 44 | 44 |
| 41 | 25.98 | 962 | 41 | 41 | 42 | 42 | 42 | 43 | 43 | 44 | 44 | 45 |
| 42 | 24.95 | 1002 | 42 | 42 | 42 | 43 | 43 | 43 | 44 | 44 | 45 | 46 |
| 43 | 22.39 | 1117 | 43 | 43 | 44 | 44 | 44 | 45 | 45 | 46 | 47 | 47 |
| 44 | 21.01 | 1190 | 44 | 44 | 45 | 45 | 45 | 46 | 47 | 47 | 48 | 48 |
| Final Firing Rate per Burner | | | 25,000 | 24,000 | 23,000 | 22,000 | 21,000 | 20,000 | 19,000 | 18,000 | 17,000 | 16,000 |

**All calculations are performed by using the first three columns of information only. Before beginning any calculations, determine the individual burner Btu size and heating value at Sea Level for the installation site. Each value shown in the Heat Value column is per burner at 3.5" W.C.**

**NOTE:**
Heat Value at Sea Level, for the location of the installation, is available from the Natural Gas Supplier to that site. Orifices for all altitudes are based on Sea Level values.

Divide the individual burner capacity (25,000 for 80 plus) by the Heat Value for the site to determine the Cubic Foot value at Sea Level, or divide burner capacity by the Cubic Foot value for the Heat Value. Once you have either the Cubic Foot Value or the Heat Value you can estimate the Sea Level orifice for the site. To select the corresponding high altitude orifice, locate the site elevation on the chart above and the orifice required at Sea Level from your calculation in the first column. The correct high altitude orifice that must be installed in each individual burner is the intersection of these two points on the chart above.

For two-stage cooling, the input for low cooling (YL) is on the ECM interface control (part number 62-24340-04 only) and not on the main IFC. This was done for convenience of production. This should be noted when routing thermostat connections since low speed cooling is not wired to the same control board as all other thermostat terminals.

**UP TO 16 SEER COOLING OPERATION**

**SINGLE-STAGE COOLING:** All IFC part numbers and revisions are compatible.

**TWO-STAGE COOLING:**

Check the part number of two-stage interface control (part #62-24340-01 or 62-24340-04). For proper operation of high SEER equipment with two-stage cooling, the part should be 62-24340-**04**. The 62-24340-01 will not operate low speed cooling and therefore will not work with two-stage cooling systems and should be replaced with the 62-24340-04 for high SEER two-stage cooling systems. One way to tell if the control is the 62-24340-04 is to look at the part to see if there is a thermostat connection for low speed cooling (YL) on the control. This will be a screw type input like those of the thermostat inputs on the main IFC. If no YL connection is available on the interface control, the furnace is not compatible with high SEER equipment or will need to be replaced.

A. Furnaces constructed up to January, 2005 are not compatible with high SEER two-stage systems and will need to be replaced with the newer furnace to insure proper operation with high SEER cooling equipment.

B. For furnaces constructed after February, 2005 but before June, 2005, the interface control can be replaced with the newer version to convert the furnace for high SEER two-stage cooling. For this scenario, contact the Rheem service department and a replacement control will be shipped. BE SURE TO REPLACE THE CONTROL BEFORE OR DURING INSTALLATION. OTHERWISE, THE SYSTEM MAY BE DOWN WHILE PARTS ARE BEING SHIPPED.

C. For furnaces constructed after June, 2005, all components necessary for proper operation of high SEER equipment are present on the furnace. There should be no additional modifications necessary.

**A NOTE ABOUT DEHUMIDIFICATION:**

High SEER systems may require the use of the onboard dehumidification feature of this system. Be sure to consult the section titled *"DEHUMIDIFICATION"* on page 28 of this document.

**TABLE 9**

**AIRFLOW AND CONDENSER SELECTION – PREMIUM COOLING SYSTEMS (1 STAGE COOL ONLY)**

| TONS | FURNACE | | APPROX. AIRFLOW (CFM) | CONDENSING UNIT | 62-24340-01 SWITCH SETTINGS | |
|---|---|---|---|---|---|---|
| | MODEL | WIDTH | | | SWITCH #5 | SWITCH #6 |
| 2 | -GPL-05 | 17.5″ | 800 | -ARA-24 | OFF | ON |
| 2-1/2 | -GPL-05 | 17.5″ | 1000 | -ARA-30 | ON | OFF |
| 2-1/2 | -GPL-07EBRKR | 21″ | 1000 | -ARA-30 | ON | OFF |
| 2-1/2 | -GPL-07EBRQR | 21″ | 1000 | -ARA-30 | ON | ON |
| 3 | -GPL-05 | 17.5″ | 1000 | -ARA-30 | ON | OFF |
| 3 | -GPL-07EBRKR | 21″ | 1200 | -ARA-36 | OFF | OFF |
| 3 | -GPL-07EBRQR | 21″ | 1200 | -ARA-36 | OFF | ON |
| 3 | -GPL-10 | 21″ | 1200 | -ARA-36 | ON | ON |
| 3 | -GPL-12 | 24.5″ | 1200 | -ARA-36 | ON | ON |
| 3-1/2 | -GPL-07EBRQR | 21″ | 1400 | -ARA-42 | ON | OFF |
| 3-1/2 | -GPL-10 | 21″ | 1400 | -ARA-42 | OFF | ON |
| 3-1/2 | -GPL-12 | 24.5″ | 1400 | -ARA-42 | OFF | ON |

Evaporator coil must be the same width as the furnace OR one size larger in width than the gas furnace. (See condenser spec sheet, I&O and other literature for evaporator selection)

**TABLE 10**

**AIRFLOW AND CONDENSER SELECTION – PREMIUM COOLING SYSTEMS (2 STAGE COOL ONLY)**

| TONS | FURNACE | | APPROX. AIRFLOW (CFM) | CONDENSING UNIT | 62-24340-01 SWITCH SETTINGS | |
|---|---|---|---|---|---|---|
| | MODEL | WIDTH | | | SWITCH #5 | SWITCH #6 |
| 2 | -GPL-05 | 17.5″ | 800 | -ARL-24 | OFF | ON |
| 3 | -GPL-05 | 17.5″ | 1200 | -ARL-36 | OFF | OFF |
| 3 | -GPL-07EBRKR | 21″ | 1200 | -ARL-36 | OFF | OFF |
| 3 | -GPL-07EBRQR | 21″ | 1200 | -ARL-36 | OFF | ON |
| 3 | -GPL-10 | 21″ | 1200 | -ARL-36 | ON | ON |
| 3 | -GPL-12 | 24″ | 1200 | -ARL-36 | ON | ON |
| 4 | -GPL-07EBRQR | 21″ | 1600 | -ARL-48 | OFF | OFF |
| 4 | -GPL-10 | 21″ | 1600 | -ARL-48 | ON | OFF |
| 4 | -GPL-12 | 24″ | 1600 | -ARL-48 | ON | OFF |
| 5 | -GPL-10 | 21″ | 1800 | -ARL-60 | OFF | OFF |
| 5 | -GPL-12 | 24″ | 1800 | -ARL-60 | OFF | OFF |

Evaporator coil must be the same width as the furnace OR one size larger in width than the gas furnace. (See condenser spec sheet, I&O and other literature for evaporator selection)
ECM interface #62-24340-01 can not be used with two-stage cooling since there is no YL input.

# START-UP PROCEDURES

## DIRECT SPARK IGNITION LIGHTING INSTRUCTIONS

This appliance is equipped with a direct spark ignition device. This device lights the main burners each time the room thermostat (closes) calls for heat. See lighting instructions on the furnace.

**TO START FURNACE**

**⚠ WARNING**

1. **BE SURE THAT THE MANUAL GAS CONTROL HAS BEEN IN THE "OFF" POSITION FOR AT LEAST FIVE MINUTES. DO NOT ATTEMPT TO MANUALLY LIGHT THE MAIN BURNERS. FAILURE TO FOLLOW THIS WARNING CAN CAUSE A FIRE OR AN EXPLOSION RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**
2. Set the room thermostat to the lowest setting.
3. Turn the gas control knob to the "On" position, or move the gas control lever to the "On" position.
4. Replace the control access door.
5. Turn on the electrical power.
6. Set the room thermostat to a point above room temperature to light the main burners. After the burners are lit, set room thermostat to a desired temperature.

**TO SHUT DOWN FURNACE**

1. Set the room thermostat to its lowest setting.
2. Shut off the gas to main burners by turning the gas control knob to the "Off" position, or by depressing the gas control lever and moving it to the "Off" position.

**⚠ WARNING**

**SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, SHUT OFF THE MANUAL GAS VALVE TO THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

**Sequence of operation with a single stage thermostat**

a. Connect the "W" terminal on the thermostat to the W2 terminal on the control board.

b. When there is a call for heat, the "R" and "W2" contacts close and the IFC runs a self check routine to verify that the pressure switch contacts are open. The limit switch contacts are constantly monitored.

c. The induced draft motor starts on high until the low pressure switch contacts close (a maximum of 60 seconds), and then changes to low speed. After a 30 second pre-purge, the spark ignitor energizes and the low stage of the gas valve opens, lighting the burners.

d. After the gas valve opens, the remote flame sensor must prove ignition for one second using the process of flame rectification. If the burners do not light, the system goes through another ignition sequence. It does this up to 4 times. (2 tries on low fire and 2 tries on high fire.)

e. The main blower starts on low speed 20 seconds after the burners light. The furnace operates on low fire for 12 minutes and then, if the thermostat is not satisfied, shifts to high fire, causing the draft inducer to go to high speed, the gas valve to 100% and the main blower goes to heat speed.

f. When the thermostat cycle ends, the gas valve closes, and the burners go out.

g. The draft inducer will continue running for a 10 second (low speed) or 5 second (high speed) post purge.

h. The main blower will run for 90 seconds on high speed or 120 seconds on low speed. (This timing is field adjustable, for 60, 90, 120 or 150 seconds). See Figure 19 for switch settings.

**Sequence if the system doesn't light or doesn't sense flame:**

a. If flame is not sensed within 8 seconds after the gas valve opens, the valve closes and the ignitor is de-energized. The induced draft motor will run for 60 seconds on low, stop momentarily, and then restart.

b. The ignition process goes through one more try on low fire. If this fails, there are two tries on high fire with a 30 second interpurge between trials. During high fire ignition attempts, the inducer steps to high speed, the high pressure switch closes (both pressure switches are now closed), and the gas valve steps to 100%.

c. If there is no ignition after the 2nd trial on high fire, the furnace goes into soft lockout for one hour.

d. The sequence repeats after a one hour delay and continues repeating until ignition is successful or the call for heat is terminated.

e. To reset the lockout, make and break power either at the thermostat or at the unit disconnect switch for 5 to 10 seconds. The furnace will then go through another set of trials for ignition.

f. If flame is established and maintained during the trial for ignition period and flame is lost, the gas valve is de-energized, the draft inducer completes a post-purge of 10 seconds. The indoor blower motor will be energized and/or remain energized on low speed for low fire and heat speed for high fire for the selected delay off time.

When the inter-purge delay is over, the control verifies the pressure switch has opened and then initiates another ignition trial period. The control will recycle up to 5 flame losses (4 re-cycles) within a single call for heat before going into lockout.

**Sequence of operation with two stage thermostat**

Connect W1 and W2 terminals on the thermostat to W and W2 terminals on the control board.

**Call for 1st stage heat**

a. R and W thermostat contacts close and the control module runs a self-check routine. After the control module verifies that both sets of pressure switch contacts are open, the induced draft motor starts on high until the low pressure switch contacts close (a maximum of 60 seconds), then changes to low speed.

b. After a 30 second pre-purge, the spark igniter energizes and the gas valve (low stage) opens, lighting the burners.

c. After the burners light, the remote flame sensor must prove ignition. If the burners do not light, the system goes through another ignition sequence. It does this up to 4 times (2 tries on low fire and 2 tries on high fire).

d. The main blower starts on low speed 20 seconds after the gas valve opens. The furnace continues to run on low until the call for heat is satisfied or the 2nd stage contacts close. If the 1st stage call for heat is satisfied the gas valve closes and the induced draft motor continues running for a 10 second post purge time. the main blower runs for 120 seconds (this timing is field adjustable). See Figure 21 for switch settings.

**Call for 2nd stage heat after 1st stage**

R and W2 thermostat contacts close, calling for 2 stage heat. The induced draft motor then switches to high speed and the high pressure switch contacts will close. The gas valve switches to high fire and the main blower switches to heating speed.

**2nd stage heat satisfied, 1st stage heat still required.**

R and W2 thermostat contacts open. The induced draft motor switches to low speed, the main blower motor switches to low speed and the gas valve changes to low fire. The furnace continues to run in this mode until the 1st stage heat call is satisfied. The system will shut down as noted in "c," under 1st stage call for heat.

## INTEGRATED FURNACE CONTROL & ECM MOTOR SETTINGS

These furnaces have ECM blower motors. These motors deliver a constant level of air flow over a wide range of external static pressures (0.1 to 0.8″ W.C.). The interface board, found beside the furnace integrated control board, provides the required communications between the main integrated furnace control and the ECM blower motor. There is a bank of 4 dip switches on the integrated furnace control which controls the blower off timings. See section on BLOWER OFF TIMINGS FOR ECM MOTORS and Figure 20 for proper switch settings.

There is a bank of 12 dip switches on the interface board which define the operation of the ECM motor. Only the first eleven switches are used for this application. See Figure 18. These switches (except for switches 9 and 12) are actually broken down into five dip switch pairs. Switches 1 and 2 act as a pair as do switches 3 and 4, 5 and 6, 7 and 8, and 10 and 11. The assignments of the switch pairs are shown in Table 11.

***IMPORTANT:** Only traditional humidistats will work with this feature.

**TABLE 11**

| SWITCHES | FUNCTION |
|---|---|
| 1 & 2 | Heating Airflow |
| 3 & 4 | Cooling Off/On Delay Profiles |
| 5 & 6 | Nominal Cooling/Heat Pump Air Flow |
| 7 & 8+ | Latent/Sensible Airflow Adjustment |
| 9 | Continuous Fan Airflow |
| 10 & 11* | On Demand Dehumidification Settings |
| 12 | Not Used |

Dehumidistats **will not** work properly with this feature.

+See Page 27 under Dehumidification.

## HEATING AIRFLOW ADJUSTMENTS

The furnace is shipped with low and high fire heating airflows. These are set from the factory to let the furnace operate at the mid point of the temperature rise range. The temperature may vary slightly due to furnace input and voltage variations. The installer is given the option of three air flow options in the heating mode as shown in Table 12. Switches 1 and 2 on the interface control regulate the steady state heating mode airflow.

In the heating mode, the ECM motor is programmed to ramp up to its target CFM over a fifteen (15) second period. After any of the user selected "Off" delays, see Figures 23 and 24, the ECM motor will ramp down to 50% of steady state CFM for approximately thirty (30) seconds. The motor will then ramp down to an off position.

**FIGURE 18**

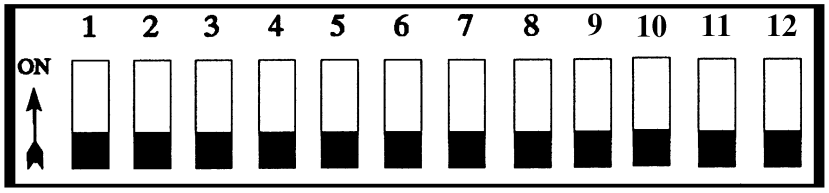



**FIGURE 19**

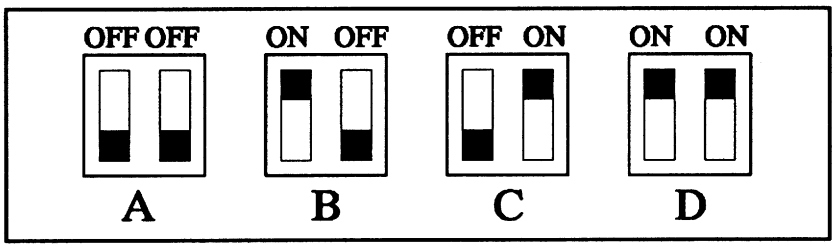
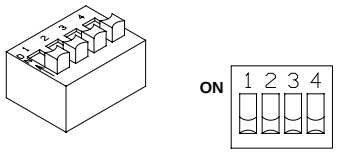



**FIGURE 20**
**BLOWER OFF TIMINGS**
**UTEC 1095 - 101 CONTROL WITH INTERFACE BOARD AND ECM MOTOR**




**NOTE: SWITCH #3 MUST BE IN OFF POSITION.**

| LOW FIRE | HIGH FIRE | NORMAL COOLING SWITCH #4 OFF | ECM COOLING 4 ON | SWITCH 1 | SWITCH 2 |
|---|---|---|---|---|---|
| 80 | 50 | 30 | 0 | OFF | ON |
| 110 | 80 | 40 | 30 | OFF | OFF |
| 150 | 120 | 60 | 20 | ON | OFF |
| 170 | 140 | 90 | 50 | ON | ON |

**TABLE 12**
**HEATING AIR FLOW SELECTIONS (SWITCHES 1 & 2)**

| Switch Selection | Temperature Rise °F |
|---|---|
| A | Mid-Rise |
| B | Mid-Rise |
| C* | Mid-Rise –10°F |
| D | Mid-Rise + 10°F |

***NOTE:** Airflow for models (-)GPL-07EBRKR and (-)GLL-07EBRKR **cannot** be adjusted to give a rise lower than mid-rise on high fire.

## COOLING AIRFLOW ADJUSTMENTS

The furnace motor is programmed to provide cooling airflows of 1½, 2, 2½ and 3 tons in the (-)GPL/LL-05 EBMKR and -07 EBRKR units. Airflows of 2½, 3, 3½, and 4 tons are available in the (-)GPL/LL-07 EBRQR units. Airflows of 3, 3½, 4 and 5 tons are available in the -10 EBRMR and -12 EARMR units. See Tables 14 and 16 for airflow options. Furnaces are shipped from the factory set for maximum cooling airflow. Adjustments to the cooling airflow may be made using switches 7 and 8 as shown in Table 13.

**TABLE 13**
**AIR FLOW ADJUSTMENT (SWITCHES 7 & 8)**

| Switch Selection | Air Flow Adjustment |
|---|---|
| A | No Adjustment |
| B | +10% |
| C | -10% |
| D | No Adjustment |

## CONTINUOUS FAN ADJUSTMENTS

There are two options for the adjustment of continuous fan. With switch 9 “ON” the speed will be high fan. With switch 9 “OFF” the speed will be soft fan. The cfm for these speeds will be a calculated percentage of the heating airflow speeds selected.

## SETTING BLOWER OFF TIMINGS FOR COOLING AND HEAT PUMP OPERATION

There is a bank of four dip switches on the main furnace control board for setting blower off timings. Switches 1 and 2 adjust the times. (See Figure 20.)

**IMPORTANT:** Switch 3 on the integrated furnace control board is not used and must be in the “OFF” position. If put in the “On” position a 5 blink fault will be flashed on the IFC.

When Switch 4 is in the “on” position on the main IFC, the blower will continue its normal speed for 0, 30, 20 or 50 seconds after a cooling or heat pump cycle has ended. This also is dependent upon the settings of Switches 1 and 2 on the IFC, see Figure 20. The blower will then enter one of four “off” delay profiles as shown in Figure 21. The profile is determined by the settings of Switches 3 and 4 on the interface board. For example: If the switches are in position “A” as shown in Figure 19, then profile “A”, as shown in Figure 21, is entered after the blower off timing.

These switch combinations between the main IFC and interface control board allow for a wide range of “off” delay timings. Switches 3 and 4 on the ECM interface control can be used with any main IFC switch 1 and 2 setting to control how the blower turns “on” and “off”. Possible “off” delay timings and profiles are shown in Table 15.

A corresponding cooling/heat pump “On” delay is also chosen by Switches 3 and 4 on the interface control as shown in Figure 22. For example, if “Off” delay profile “A” is chosen in Figure 21, then “ON” delay profile “A” in Figure 22 is automatically chosen.

### DEHUMIDIFICATION

The interface control has two optional 24 volt AC only inputs. The “B” terminal input is provided for heat pump applications. This signal comes from a heat pump thermostat and tells the heat pump to switch its reversing valve to heat mode. If this “B” signal is also routed to the interface control, all airflow adjust switches (7 & 8) and “On Demand Dehumidification” are bypassed in the heat mode only. The airflow will remain at the normal airflow as selected by switches 5 & 6 throughout the heat mode. This allows the user to have a switched (-10%) airflow adjustment for dehumidification or the “On Demand Dehumidification” in cooling mode, but not the adverse humidity and heat rise effects of using these adjustments during a heat pump’s heat mode. The “B” terminal does not apply to gas operation.

The “On Demand Dehumidification” input allows the user to have automatic dehumidification that is controlled by the user’s humidistat setting. Dehumidistats are not compatible with the interface control. When the humidity exceeds the humidistat setting, it routes a 24 volt, AC only, signal to the “On Demand Dehumidification” terminal. This will in turn decrease the airflow by 15%. This results in higher latent capacity and increases the level of comfort. This feature is only available in the cooling mode.

**TABLE 14**
**COOLING AIR FLOW (SWITCHES 5 & 6)**

| Switch Selection | (-)GPL/GLL-05EBMKR | (-)GPL/GLL-07EBRKR | (-)GPL/GLL-07EBRQR | (-)GPL/GLL-10EBRMR Air Flow | (-)GPL/GLL-12EARMR Air Flow |
|---|---|---|---|---|---|
| A | 1200 | 1200 | 1600 | 2000 | 2000 |
| B | 1000 | 1000 | 1400 | 1600 | 1600 |
| C | 800 | 800 | 1200 | 1400 | 1400 |
| D | 600 | 600 | 1000 | 1200 | 1200 |

**TABLE 15**
**TWO STAGE IFC’S SWITCHES 1, 2 & 4 COOLING OFF DELAY TIMINGS & PROFILES - SEE FIGURES 20-23**

| SWITCH #1 | SWITCH #2 | SWITCH #4 + PROFILE-OFF (SWITCHES 3 & 4 On Interface Board) | | SWITCH #4 + PROFILE ON (SWITCHES 3 & 4 On Interface Board) | |
|---|---|---|---|---|---|
| Off | On | 30 sec. | +A, B, C or D | 0 sec. | +A, B, C, or D |
| Off | Off | 40 sec. | +A, B, C or D | 30 sec. | +A, B, C or D |
| On | Off | 60 sec. | +A, B, C or D | 20 sec. | +A, B, C or D |
| On | On | 90 sec. | +A, B, C or D | 50 sec. | +A, B, C or D |

| Switch Selection | Air Flow Adjustment |
|---|---|
| A | 15% Less cooling Airflow |
| B | Normal Cooling Air Flow for Table 7 |
| C | On Demand Dehumidification (Humidistat controls cooling airflow) |
| D | Normal Cooling Air Flow |

**FIGURE 21**
**COOLING/HEAT PUMP "OFF" DELAY PROFILES**

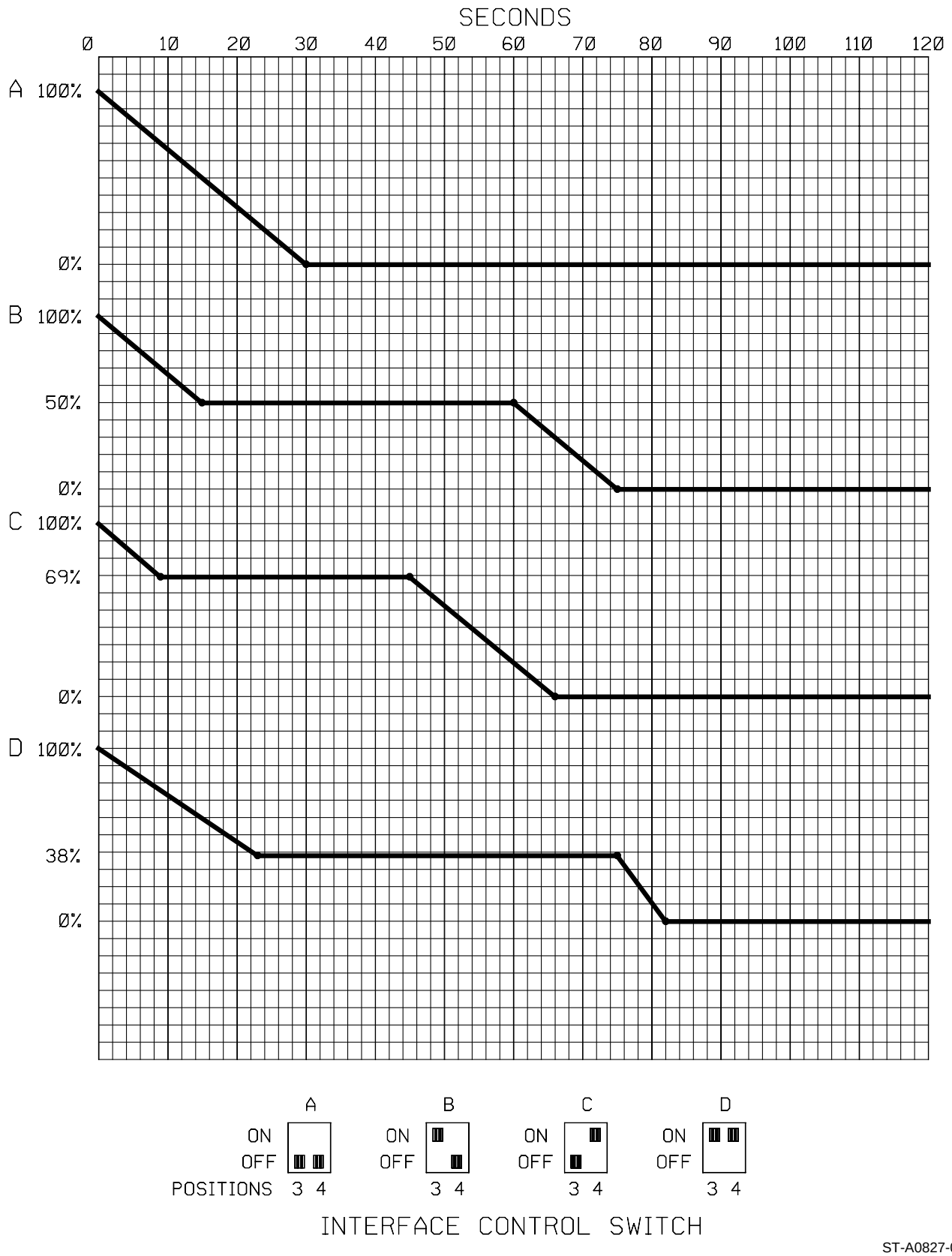



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**FIGURE 22**
**COOLING/HEAT PUMP "ON" DELAY PROFILES**

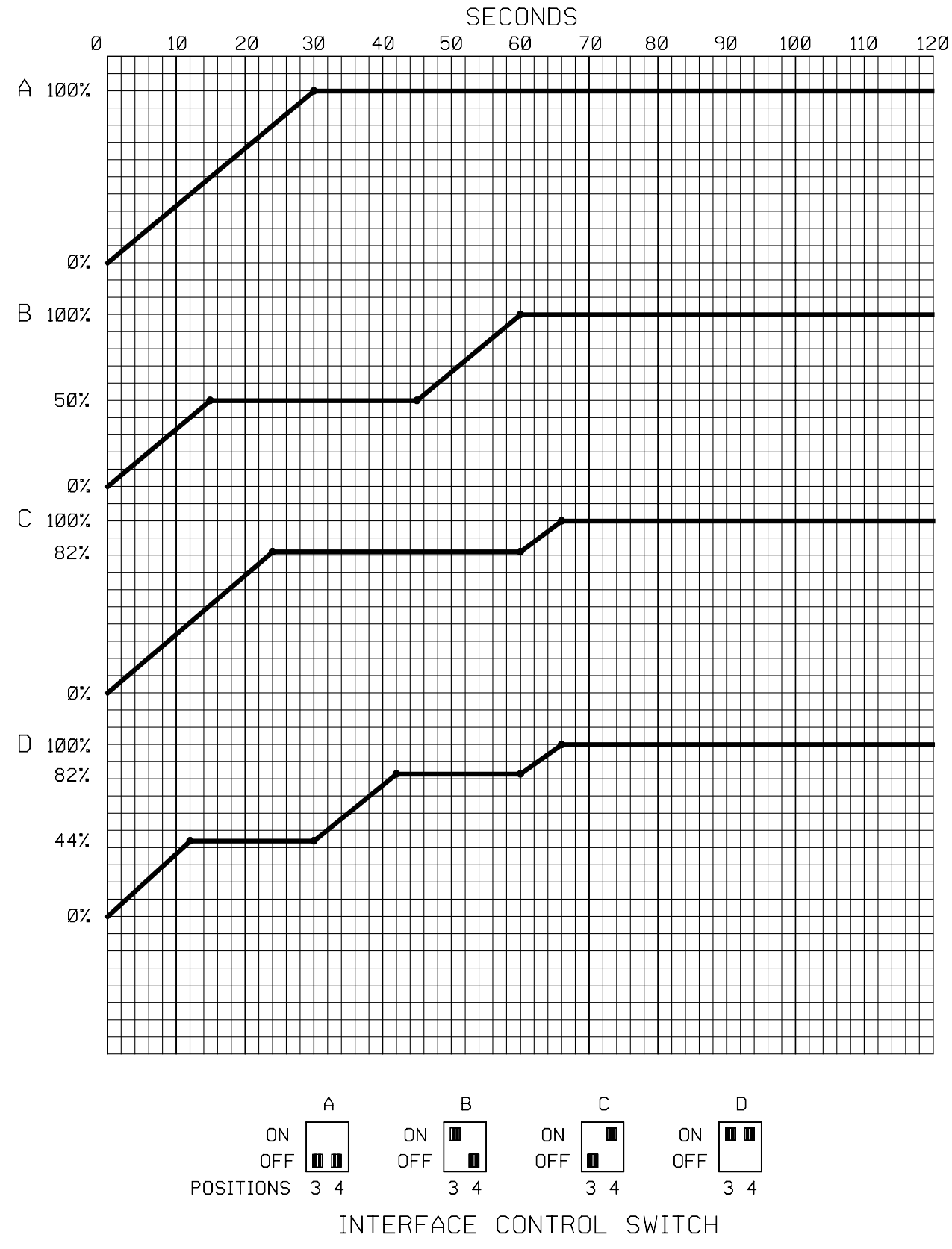


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**FIGURE 23**
**LOW HEAT "OFF" DELAY PROFILES**

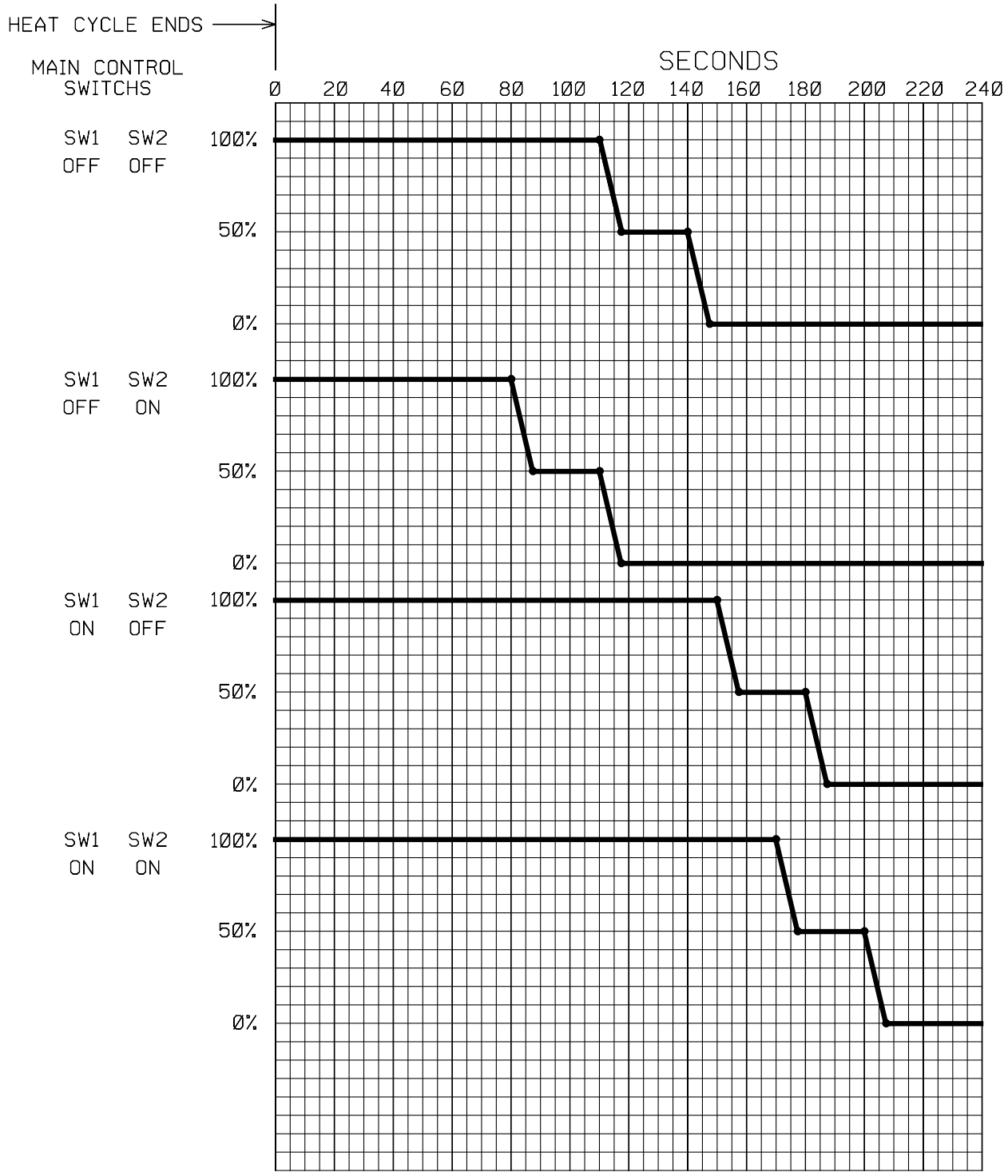


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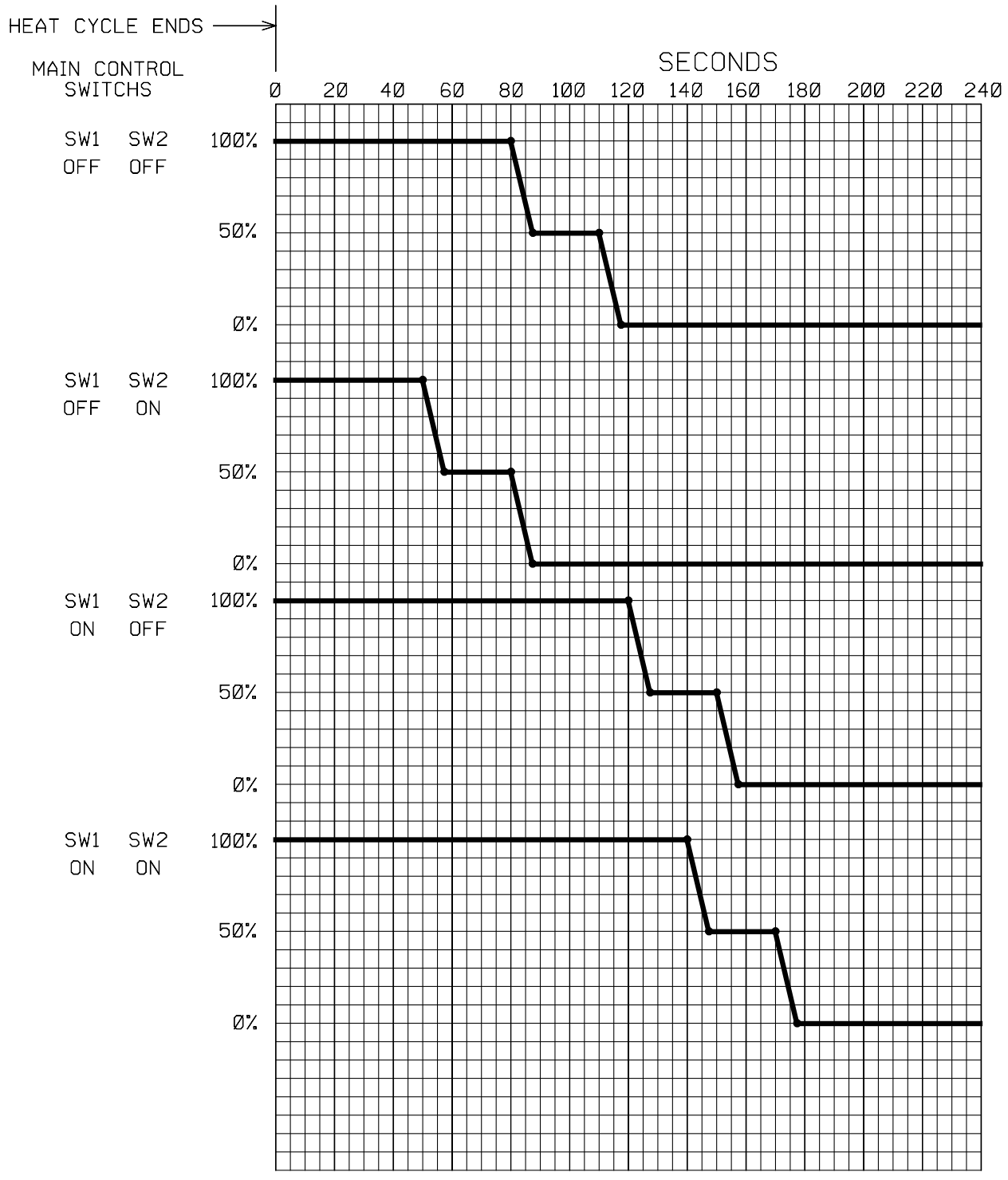
**FIGURE 24**
**HIGH HEAT "OFF" DELAY PROFILES**

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# AIR FLOW

The importance of proper air flow over the heat exchanger cannot be over emphasized. One of the most common causes of heat exchanger failure is overheating due to low air flow. An air flow table is located inside the blower door and on the following pages.

**NOTE:** The installation of the duct system is under the control of the installing contractor. If the duct system is not correctly sized and installed, the homeowner may experience air noise, low or no airflow out of some vents, component failures, or high utility bills. Other miscellaneous problems are also possible.

### TEMPERATURE RISE CHECK

To determine if the air flow is correct, make a temperature rise check.

1. Insert a thermometer in the supply air duct as close to the furnace as possible yet out of a direct line from the heat exchanger. See Figure 25.
2. Insert a thermometer in the return air duct as close to the furnace as possible.
3. Operate the furnace.
4. When the thermometer in the supply air duct stops rising (approximately five minutes), subtract the return air temperature from the supply air temperature. The difference is the temperature rise.
5. Compare the measured temperature rise to the approved temperature rise range listed on the furnace name plate. See Figure 26.

If the measured temperature rise is above the approved range, the air flow is too low. More air must be moved by speeding up the blower, by removing restrictions in the duct system, or by adding more supply or return air duct. If the measured temperature rise is below the approved range, the air flow is too much. Use dip switches on the blower interface board to adjust airflow.

Ideally the measured temperature rise should be in the middle of the range.

The rise range is the same for high and low inputs.

**FIGURE 25**
**TEMPERATURE RISE MEASUREMENT**

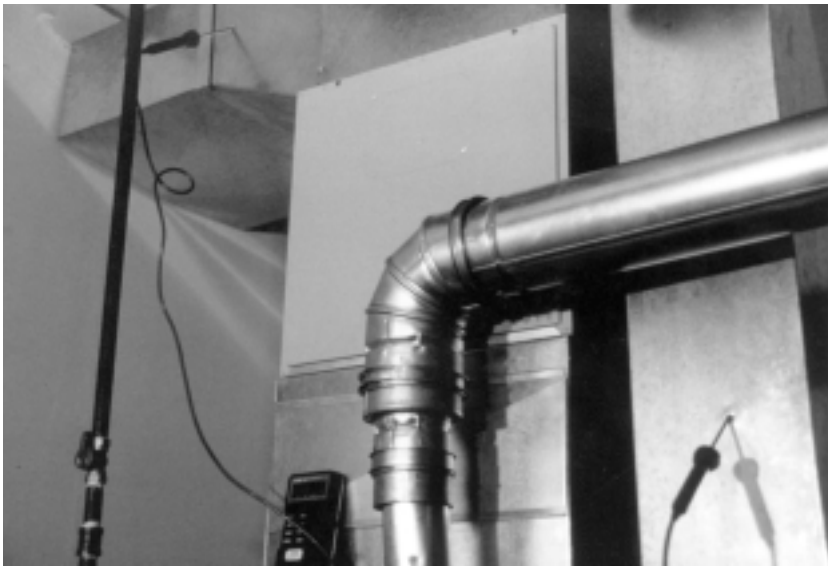


**FIGURE 26**
**FURNACE NAME PLATE**

CANADIAN ENERGY PERFORMANCE VERIFIED

RENDEMENT ENERGETIQUE VERIFIE

AIR CONDITIONING DIVISION
FORT SMITH, ARKANSAS

MODEL NO./NUMERO DE MODELE:
SERIAL NO./NUMERO DE SERIE:

CATEGORY IV FORCED AIR FURNACE WHEN USING INDOOR AIR FOR COMBUSTION. CATEGORY IV TYPE FSP DIRECT VENT FORCED AIR FURNACE WHEN USING OUTDOOR AIR FOR COMBUSTION. FOR INDOOR INSTALLATION ONLY. IN A BUILDING CONSTRUCTED ON-SITE.
CATÉGORIE IV GÉNÉRATEUR D'AIR CHAUD À AIR FORCÉE LORSQUE DE L'AIR INTÉRIEUR EST EMPLOYÉ POUR LA COMBUSTION. CATÉGORIE IV TYPE FSP ÉVACUATION DIRECTE GÉNÉRATEUR D'AIR CHAUD À AIR FORCÉE LORSQUE DE L'AIR EXTERIEUR EST EMPLOYÉ POUR LA COMBUSTION. POUR INSTALLATION À L'INTÉREIER SEULEMENT, DANS UN BATIMENT CONSTRUIT SUR LE SITE.

ELECTRIC 115 V. 60 HZ 1 PH, MAXIMUM TOTAL INPUT 6.3 AMPS.
ELECTRIQUE 115 V. 60 HZ 1 PH, PUISSANCE D' ENTRÉE TOTALE MAXIMUM 6.3 A.
MAXIMUM OVERCURRENT PROCTECTION 15 AMPERES. DISJONCTEUR À MAXIMA 15 A.

| HOURLY INPUT RATING DEBIT CALORIFQUE MAXIMUM Btu/hr (Kw) | HOURLY INPUT RATING DEBIT CALORIFQUE MINIMUM Btu/hr (Kw) | FACTORY EQUIPPED FOR AGENCE A L'USINE POUR FOR GAS / GAZ |
|---|---|---|
| 75,000 (21.98) | 52,500 (15.39 | NATURAL / NATUREL |

THIS APPLIANCE EQUIPPED FOR ALTITUDES/CET APPAREIL EST EQUIPÉ POUR ALTITUDES COMPRISES
ENTIRE 0 – 2,000 ( 0– 610) (CANADA ONLY) FT.(M)/PIEDS(M)
ORIFICE/ INJECTEUR # 50 DMS (CANADA ONLY)
LIMIT SETTING/LIMITE COUPE-CIRCUIT 200 (93) °F[°C]
AUXILIARY LIMIT SETTING/
LIMITE COUPE-CIRCUIT AUXILIAIRE °F[°C]

| | NATURAL GAS/ GAZ NATUREL | LP GAS OR PROP./ GAZ DE PÉTROLE LIQUÉFIÉ OU PROP. |
|---|---|---|
| | IN. W.C.(kPa)/ PO. C.E.(kPa) | IN. W.C.(kPa)/ PO.C.E.(kPa) |
| MAXIMUM PERMISSIBLE GAS SUPPLY PRESSURE TO FURNACE | 10.5 (2.61) | 13.0 (3.23) |
| PRESSION MAXIMUM D'ALIMENTATION EN GAZ À CHAUDIÈRE | 10.5 (2.61) | 13.0 (3.23) |
| MINUMUM GAS SUPPLY PRESSURE FOR PURPOSES OF INPUT ADJUSTMENT | 5.0 (1.24) | 11.0 (2.73) |
| PRESSION MINIMUM D'ALIMENTATION EN GAZ POUR LE RÈGLAGE DE PUISSANCE D'ENTRÉE | 5.0 (1.24) | 11.0 (2.73) |
| MANIFOLD PRESSURE/PRESSION A LA TUBULURE | 3.5 (0.87) | 10.0 (2.49) |

MANIFOLD PRESSURE-LOW INPUT NAT.-1.7WC(4.32CM)/LP-4.9WC(12.45 CM)
AIR TEMPERATURE RISE/
AUGMENTATIONDE LA TEMPÉATUREDE L'AIR 45 (25) TO 75 (42) °F(°C)

| MAXIMUM EXTERNAL STATIC PRESSURE PRESSION STATIQUE EXTÉRIEURE MAXIMAL INCHES W.C. (kPa)-PO.C.E.(kPA) | BLOWER/ SOUFFLEUR INCH (mm)/PO.(mm) | MOTOR FORCE HP ( W ) |
|---|---|---|
| .12 (.125) | 11-7 (279-178) | 1/2 (373) |
| .50 (.125) | 11-7 (279-178) | 1/2 (373) |

ANSI Z21.47a * CSA 2.3a -2001 CENTRAL FURN. MADE IN THE USA 91-22176-09

# SAFETY FEATURES

## LIMIT CONTROL

The high limit cut-off temperature is set at the factory and cannot be adjusted. The temperature setting prevents the air temperature leaving the furnace from exceeding the maximum outlet air temperature, which, if exceeded, will shut the furnace down.

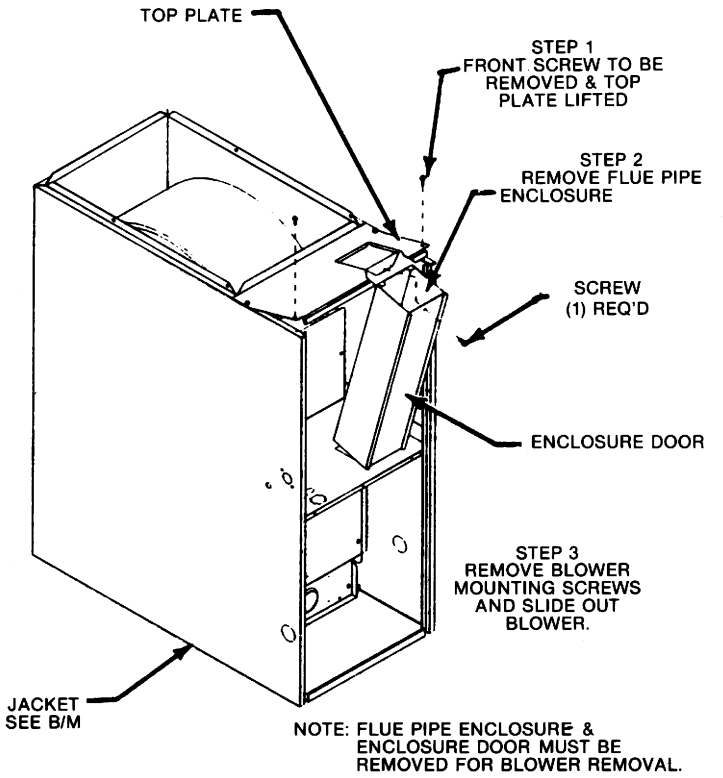
There are several reasons for a limit switch to open and almost always involve low airflow through the furnace.

1. A dirty or restricted air filter.
2. A dirty or restricted cooling coil.
3. Undersized or restricted return air system.
4. Undersized or restricted supply air system.
5. A problem affecting the main blower;
   A. A wrong speed tap selection.
   B. Failing motor bearings.
   C. Low voltage to the motor.
   D. Dirty blower wheel.
   E. Wrong motor rotation.
   F. Blower wheel slipping on the motor shaft.
6. Overfiring the furnace with too much gas pressure.
7. Ventilation problems.

## FLAME ROLL-OUT SAFETY SWITCHES

Furnaces are equipped with safety switches to protect against flame roll-out conditions in the burner compartment, which, if tripped, will terminate the heating cycle. In the event of a flame roll-out condition, the switch will shut the furnace down. Switches for the (-)GPN/(-)GPP furnaces are located on either side of the burner cover plate and just above the burners on the blower divider panel. If a switch is tripped, it must be manually rest. DO NOT jumper or reset this switch. If this switch should trip, a qualified installer, service agency or the gas supplier should be called to diagnose and/or correct the sourse of tripping. If this unit is mounted in a closet, the door must be closed when making this check.

**FIGURE 27**
**DOWNFLOW BLOWER REMOVAL**




## PRESSURE SWITCHES

This furnace has two pressure switches for sensing a blocked vent condition. One is for high pressure and the other for low pressure. When the draft inducer is running on high speed, both switches will normally close. when running on low inducer speed, only the low pressure switch will close. If there is a blocked vent condition, failed inducer motor or leak in the pressure switch hoses, the pressure switch contacts will remain open. The “STATUS” light will blink twice, indicating a pressure switch problem. The high fire pressure switch is located in the upper position on the furnace.

### LUBRICATION

The blower motor and induced draft motor are permanently lubricated by the manufacturer and do not require further attention.

The motor must be cleaned periodically by a qualified installer, service agency, or the gas supplier to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean because dirty filters can restrict airflow and the motor depends upon sufficient air flowing across and through it to keep from overheating.

Reference Figure 27 for proper removal of blower assembly on downflow models.

# MAINTENANCE

**⚠ WARNING**

**DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.**

## FILTERS

Filter application and placement are critical to airflow, which may affect the heating and cooling system performance. Reduced airflow can shorten the life of the system's major components, such as motor, limits, elements, heat exchanger, evaporator coil or compressor. Consequently, we recommend that the return air duct system have only one filter location. The most common location will be inside the furnace or air handler or a filter base. For systems with a return air filter grill or multiple filter grills, can have a filter installed at each of the return air openings. DO NOT DOUBLE FILTER THE RETURN AIR DUCT SYSTEM. DO NOT FILTER THE SUPPLY AIR DUCT SYSTEM.

If high efficiency filters or electronic air cleaners are used in the system, it is important that the airflow is not reduced to maximize system performance and life. Always verify that the system's airflow is not impaired by the filtering system that has been installed, by performing a temperature rise and temperature drop test.

**NOTE:** Airflow external static pressure measurements do not include filter or coil.

**FIGURE 28**
**RESIZING FILTERS & FRAME**

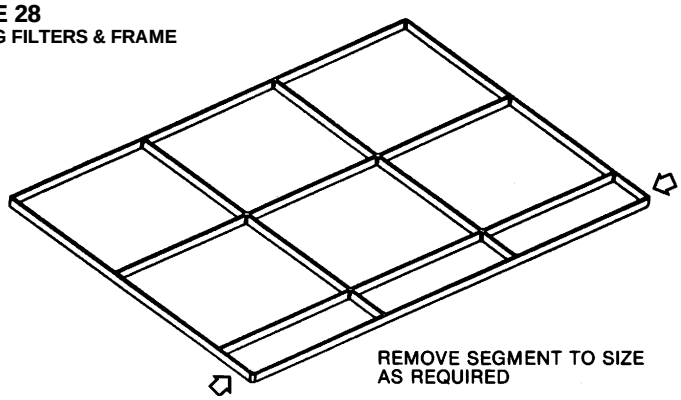



**TABLE 17 FILTER SIZES**

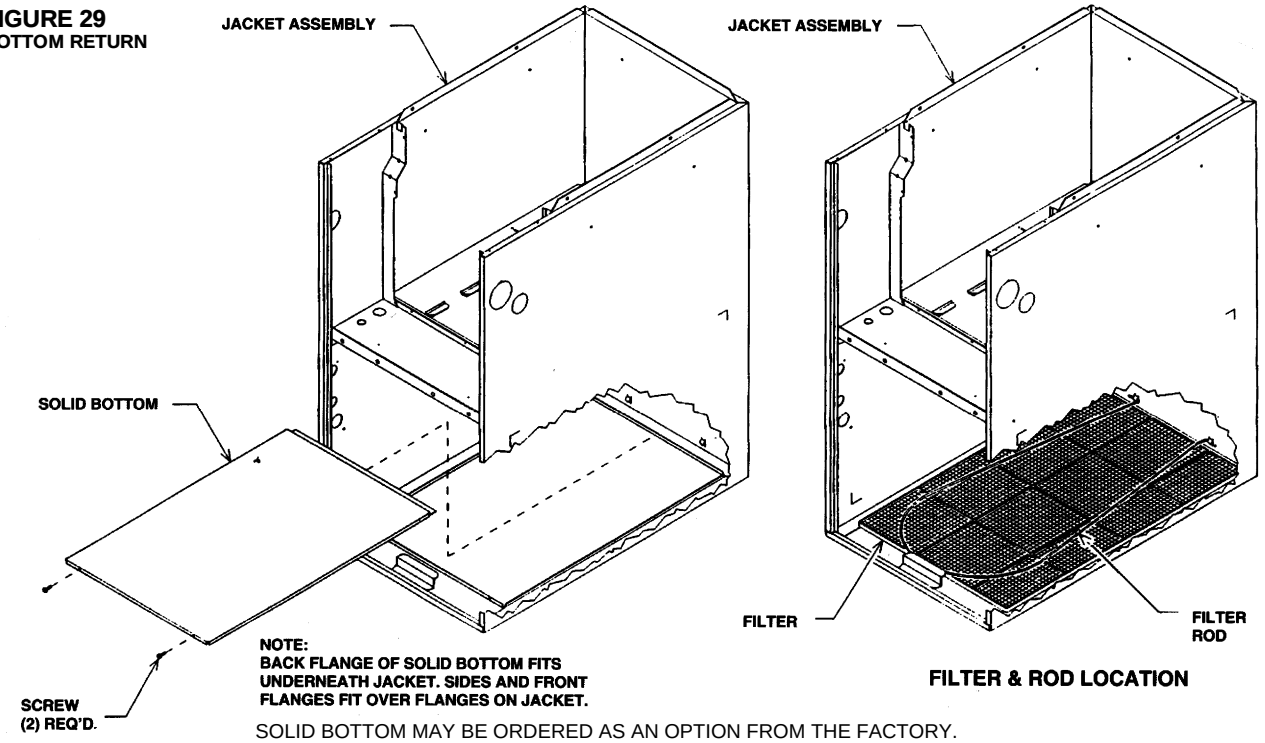
| UPFLOW FILTER SIZES | | | | |
|---|---|---|---|---|
| FURNACE WIDTH | INPUT BTUH | BOTTOM SIZE | SIDE SIZE | QUANTITY |
| 17-1/2" | 50 & 100 | 15¾" X 25" | 15¾" X 25" | 1 |
| 21" | 75 & 100 | 19¾" X 25" | 15¾" X 25" | 1 |
| 24-1/2" | 125 | 22¾" X 25" | 15¾" X 25" | 1 |

| DOWNFLOW FILTER SIZES | | | |
|---|---|---|---|
| FURNACE WIDTH | INPUT BTUH | SIZE | QUANTITY |
| 14" | 50 | 14" X 20" | 1 |
| 17½" | 75 & 100 | 12" X 20" | 2 |
| 21" | 100 | 12" X 20" | 2 |
| 24½" | 125 & 150 | 14" X 20" | 2 |

| Unit Size | Unit Width | Filter Rod 20¾" AE-61659-02 | Filter Rod 24¼" AE-61659-03 | Bottom | Side |
|---|---|---|---|---|---|
| 50,000 | 17-1/2" | 1 | | Cut Off 3½" | As is |
| 75,000 | 21" | 1 | | Cut Off 3½" | As is |
| 100,000 | 21" | 1 | | Cut Off 3½" | As is |
| 125,000 | 24½" | | 1 | As is | Cut Off 3½" |

***NOTE:** Some filters must be resized to fit certain units and applications.

**FIGURE 29**
**BOTTOM RETURN**




SOLID BOTTOM MAY BE ORDERED AS AN OPTION FROM THE FACTORY.

**FIGURE 30**
**FILTER RETAINING RODS (SIDE RETURN)**

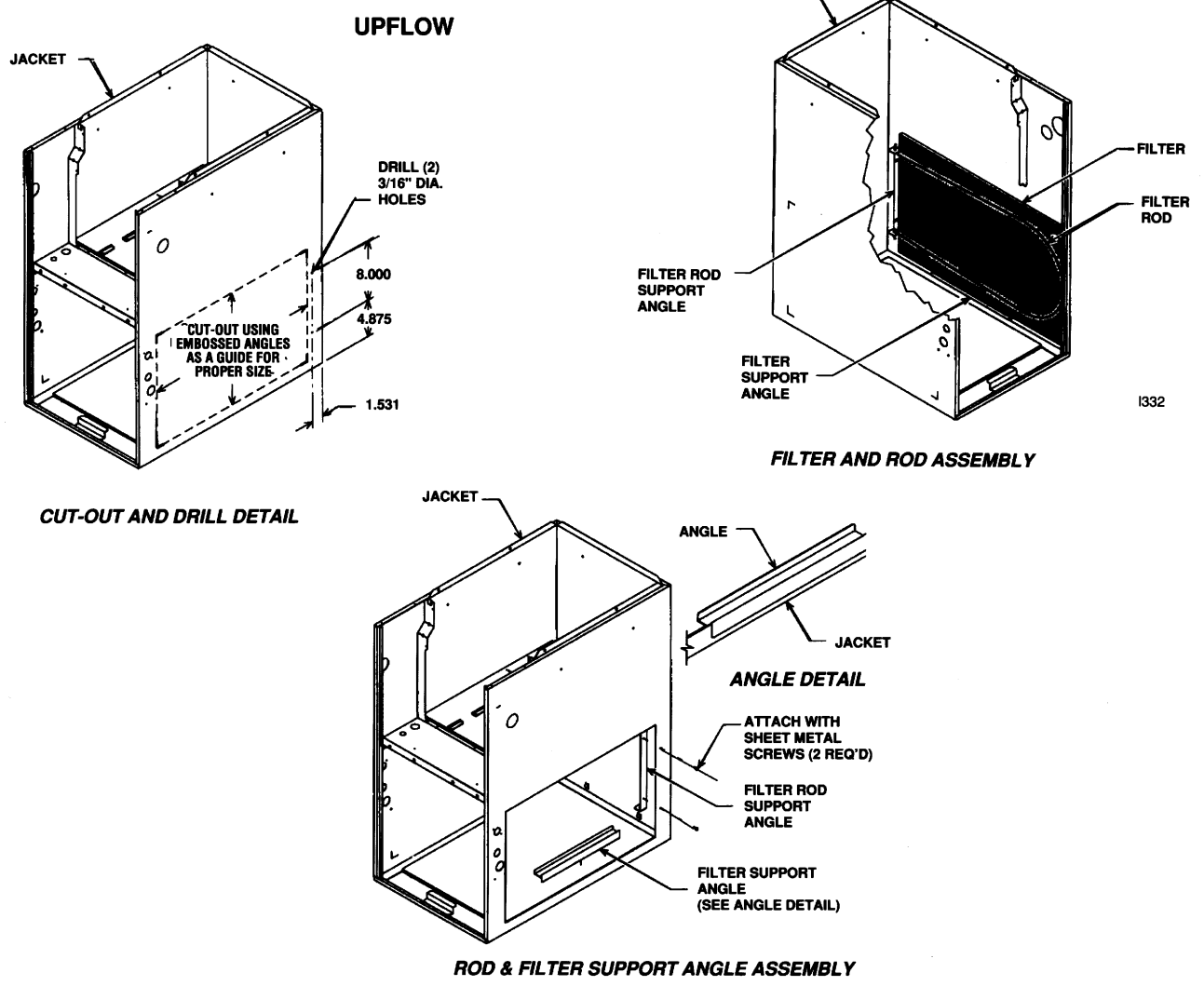
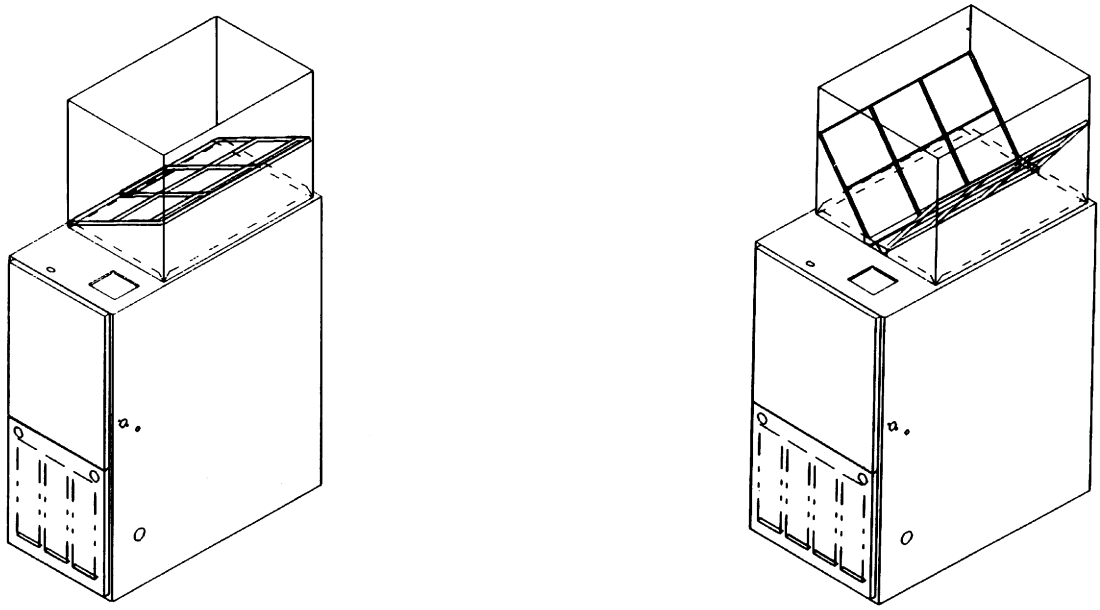



**FIGURE 31**
**DOWNFLOW FILTER INSTALLATION**



Keep the air filters clean at all times. Vacuum dirt from filter, wash with detergent and water, air dry thoroughly and reinstall.

1. 17½″-50,000 btuh unit requires removal of 3½″ segment of filter and frame to get proper width for a bottom filter.
2. 21″-75.000-100,000 btuh units requires removal of 3½″ segment of filter and frame to get proper width for a side filter.
3. 24½″-125,000 btuh unit require removal of 7″ segment of filter and frame to get proper width for a side filter.

**IMPORTANT:** Do not operate the system without filters. A portion of the dust entrained in the air may temporarily lodge in the air duct runs and at the supply registers. Any recirculated dust particles will be heated and charred by contact with the furnace heat exchanger. This residue will soil ceilings, walls, drapes, carpets, and other household articles.

# SYSTEM OPERATION INFORMATION

## Advise The Customer To:

1. Keep the air filters clean. The heating system will operate better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This will reduce the heating load on the system.
4. Avoid excessive use of kitchen & bathroom exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6 Except for the mounting platform, keep all combustible articles three feet from the furnace and vent system.
7. **IMPORTANT:** Replace all blower doors and compartment covers after servicing the furnace. Do not operate the unit without all panels and doors securely in place.
8. Proper operation of the system with constant air circulation.

**⚠ WARNING**

**COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE FURNACE JACKET OR WITHIN THE SPECIFIED CLEARANCES OF THE VENT PIPE. THE AREA AROUND THE FURNACE MUST BE KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. PLACEMENT OF COMBUSTIBLE MATERIALS ON, AGAINST OR AROUND THE FURNACE JACKET CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THE FURNACE OWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.**

# ANNUAL INSPECTION

The furnace should operate for many years without excessive scale build-up in the flue passageways, however, it is recommended that a qualified installer, service agency, or the gas supplier actually inspect the flue passageways, the vent system and the main and pilot burners for continued safe operation paying particular attention to deterioration from corrosion or other sources.

**⚠ WARNING**

**HOLES IN THE VENT PIPE OR HEAT EXCHANGER CAN CAUSE TOXIC FUMES TO ENTER THE HOME RESULTING IN CARBON MONOXIDE POISONING OR DEATH. THE VENT PIPE OR HEAT EXCHANGER MUST BE REPLACED IF THEY LEAK.**

- **IMPORTANT:** It is recommended that at the beginning of the heating season and approximately midway in the heating season a visual inspection be made of the main burner flames and pilot flame on standing pilot models for the desired flame appearance by a qualified installer, service agency, or the gas supplier.
- **IMPORTANT:** It is also recommended that at the beginning of the heating season, the flame sensor on hot surface ignition models be cleaned with steel wool by a qualified installer, service agency, or the gas supplier.
- **IMPORTANT:** It is recommended that an annual inspection and cleaning of all furnace markings be made to assure legibility. Attach a replacement marking, which can be obtained through the distributor, if any are found to be illegible or missing.

**IMPORTANT: FOR Nox MODELS –** At the beginning of the heating season a visual inspection of the Nox device should be made to ensure they have not become obstructed by insects nests or anything else which may effect performance.

# REPLACEMENT PARTS

Contact your local distributor for a complete parts list. See enclosed sheet.

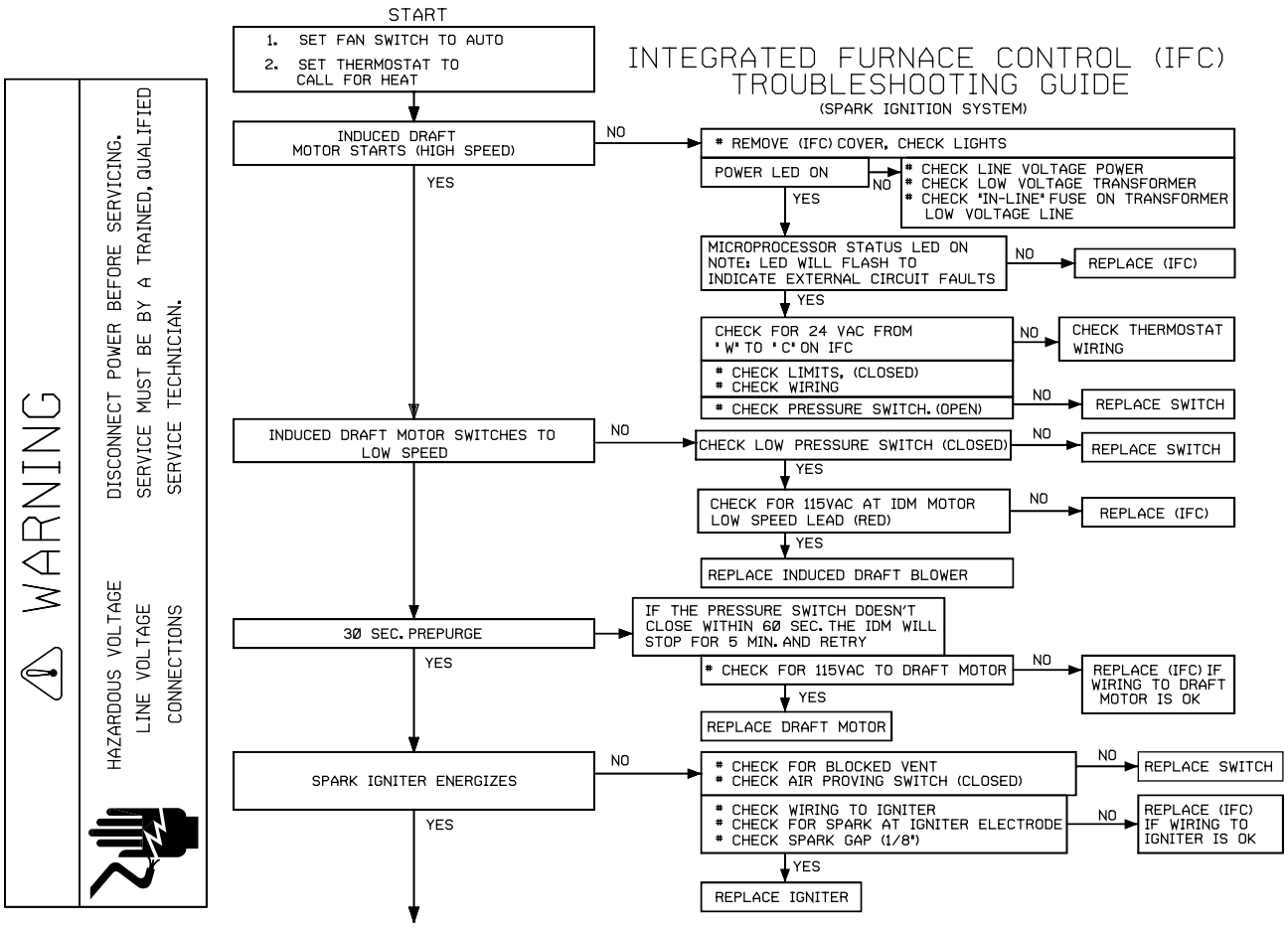
# TROUBLESHOOTING

Refer to Figure 32 for determining cause of unit problems.

# WIRING DIAGRAM

Figure 33 is the complete wiring diagram for the furnace and power source.

**FIGURE 32**
**INTEGRATED FURNACE CONTROL (IFC) TROUBLESHOOTING GUIDE FOR UTEC 1095-101**



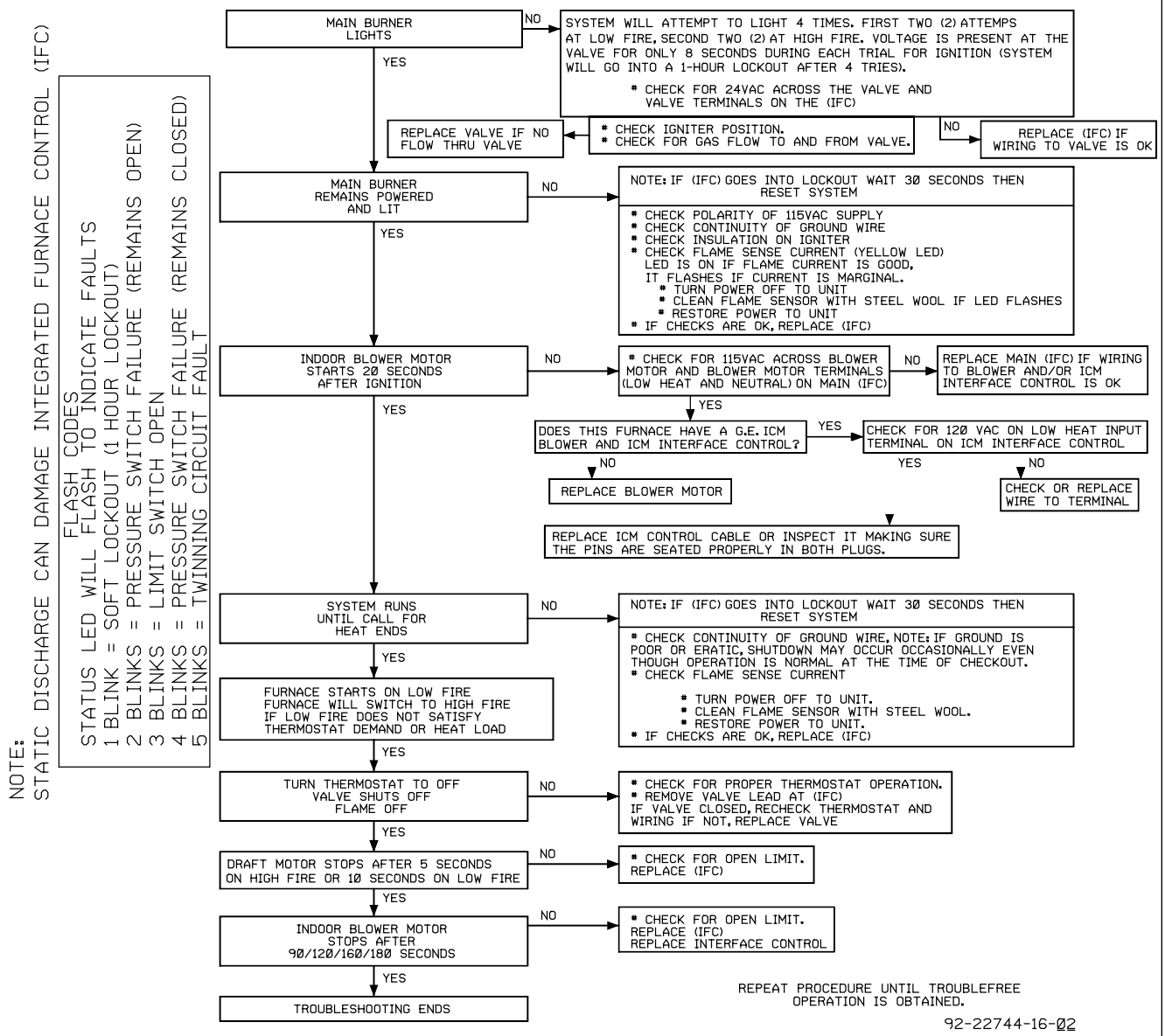

NOTE:
STATIC DISCHARGE CAN DAMAGE INTEGRATED FURNACE CONTROL (IFC)
FLASH CODES
STATUS LED WILL FLASH TO INDICATE FAULTS
1 BLINK = SOFT LOCKOUT (1 HOUR LOCKOUT)
2 BLINKS = PRESSURE SWITCH FAILURE (REMAINS OPEN)
3 BLINKS = LIMIT SWITCH OPEN
4 BLINKS = PRESSURE SWITCH FAILURE (REMAINS CLOSED)
5 BLINKS = TWINNING CIRCUIT FAULT
MAIN BURNER LIGHTS
NO
SYSTEM WILL ATTEMPT TO LIGHT 4 TIMES. FIRST TWO (2) ATTEMPS AT LOW FIRE, SECOND TWO (2) AT HIGH FIRE. VOLTAGE IS PRESENT AT THE VALVE FOR ONLY 8 SECONDS DURING EACH TRIAL FOR IGNITION (SYSTEM WILL GO INTO A 1-HOUR LOCKOUT AFTER 4 TRIES).
* CHECK FOR 24VAC ACROSS THE VALVE AND VALVE TERMINALS ON THE (IFC)
YES
* CHECK IGNITER POSITION.
* CHECK FOR GAS FLOW TO AND FROM VALVE.
NO
REPLACE (IFC) IF WIRING TO VALVE IS OK
REPLACE VALVE IF NO FLOW THRU VALVE
MAIN BURNER REMAINS POWERED AND LIT
NO
NOTE: IF (IFC) GOES INTO LOCKOUT WAIT 30 SECONDS THEN RESET SYSTEM
* CHECK POLARITY OF 115VAC SUPPLY
* CHECK CONTINUITY OF GROUND WIRE
* CHECK INSULATION ON IGNITER
* CHECK FLAME SENSE CURRENT (YELLOW LED)
LED IS ON IF FLAME CURRENT IS GOOD,
IT FLASHES IF CURRENT IS MARGINAL.
* TURN POWER OFF TO UNIT
* CLEAN FLAME SENSOR WITH STEEL WOOL IF LED FLASHES
* RESTORE POWER TO UNIT
* IF CHECKS ARE OK, REPLACE (IFC)
YES
INDOOR BLOWER MOTOR STARTS 20 SECONDS AFTER IGNITION
NO
* CHECK FOR 115VAC ACROSS BLOWER MOTOR AND BLOWER MOTOR TERMINALS (LOW HEAT AND NEUTRAL) ON MAIN (IFC)
NO
REPLACE MAIN (IFC) IF WIRING TO BLOWER AND/OR ICM INTERFACE CONTROL IS OK
YES
YES
DOES THIS FURNACE HAVE A G.E. ICM BLOWER AND ICM INTERFACE CONTROL?
YES
CHECK FOR 120 VAC ON LOW HEAT INPUT TERMINAL ON ICM INTERFACE CONTROL
NO
YES
NO
REPLACE BLOWER MOTOR
CHECK OR REPLACE WIRE TO TERMINAL
REPLACE ICM CONTROL CABLE OR INSPECT IT MAKING SURE THE PINS ARE SEATED PROPERLY IN BOTH PLUGS.
SYSTEM RUNS UNTIL CALL FOR HEAT ENDS
NO
NOTE: IF (IFC) GOES INTO LOCKOUT WAIT 30 SECONDS THEN RESET SYSTEM
* CHECK CONTINUITY OF GROUND WIRE, NOTE: IF GROUND IS POOR OR ERATIC, SHUTDOWN MAY OCCUR OCCASIONALLY EVEN THOUGH OPERATION IS NORMAL AT THE TIME OF CHECKOUT.
* CHECK FLAME SENSE CURRENT
* TURN POWER OFF TO UNIT.
* CLEAN FLAME SENSOR WITH STEEL WOOL.
* RESTORE POWER TO UNIT.
* IF CHECKS ARE OK, REPLACE (IFC)
YES
FURNACE STARTS ON LOW FIRE
FURNACE WILL SWITCH TO HIGH FIRE IF LOW FIRE DOES NOT SATISFY THERMOSTAT DEMAND OR HEAT LOAD
YES
TURN THERMOSTAT TO OFF
VALVE SHUTS OFF
FLAME OFF
NO
* CHECK FOR PROPER THERMOSTAT OPERATION.
* REMOVE VALVE LEAD AT (IFC)
IF VALVE CLOSED, RECHECK THERMOSTAT AND WIRING IF NOT, REPLACE VALVE
YES
DRAFT MOTOR STOPS AFTER 5 SECONDS ON HIGH FIRE OR 10 SECONDS ON LOW FIRE
NO
* CHECK FOR OPEN LIMIT.
REPLACE (IFC)
YES
INDOOR BLOWER MOTOR STOPS AFTER 90/120/160/180 SECONDS
NO
* CHECK FOR OPEN LIMIT.
REPLACE (IFC)
REPLACE INTERFACE CONTROL
YES
TROUBLESHOOTING ENDS
REPEAT PROCEDURE UNTIL TROUBLEFREE OPERATION IS OBTAINED.
92-22744-16-02

**FIGURE 33**

**FOR MODELS WITH UT ELECTRONIC CONTROLS 1095-101 INTEGRATED FURNACE CONTROL AND ECM BLOWER MOTOR**